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REVIEW
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FILE

KLINKOWSKI (M.). **Das Blumenkohlmosaic.** [Cauliflower mosaic.]—*Z. PflKrankh.*, 60, 5, pp. 260–264, 1953.

This summary of information on the geographical distribution, economic importance, symptomatology, host range, transmissibility, strain differentiation, and control of cauliflower mosaic virus [*R.A.M.*, 30, p. 297] was compiled from 39 contributions to the literature, most of which have been noticed in this *Review*.

VAN SCHREVEN (D. A.). **Alternaria, Stemphylium en Botrytis aantasting bij Koolzaad (Brassica napus).** [*Alternaria*, *Stemphylium*, and *Botrytis* infection of Colza (*Brassica napus*).]—*Tijdschr. PlZiekt.*, 59, 4, pp. 105–136, 23 figs., 1 diag., 2 graphs, 1953. [English summary.]

The severe damage to the colza seed crop caused in 1950 in the Noordoostpolder region of Holland by the 'speckle' or 'dark leaf spot' disease prompted this exhaustive study on its etiology and control. *Alternaria brassicae* [*R.A.M.*, 29, p. 495], *A. brassicicola*, *A. tenuis*, *Stemphylium* spp. (including *S. consortiale* [cf. 24, p. 42]), and *Botrytis cinerea* [32, p. 11] were isolated from necrotic lesions on the stalks and siliquas, the first- and last-named species being the most prevalent. Seed samples yielded *A. brassicae* and *A. brassicicola* [cf. 32, p. 292].

The isolates of *A. brassicae* were of several types, differing macroscopically in culture on cherry agar, as well as in pathogenicity to colza seedlings. The most virulent strains were used for the assay of fungicides, laboratory tests with which were performed after inoculation with fresh conidial suspensions of both *A.* spp. [32, p. 609]. Infection was substantially reduced, but not entirely prevented, by atomization with 8 per cent. koneprox [cf. 31, p. 80; 32, pp. 105, 151] or cuproxol at 10 ml. per sq. yd. Used at the same rate, a combination of the two fungicides induced the formation of numerous small, necrotic spots on the stalks and pods. Of the zineb compounds tested, lirotan, tritoftorol, triscabol [cf. 31, p. 479], and M 555 at 8 per cent. (10 ml. per sq. yd.) were the most effective. Promising results were obtained in field experiments in 1952, e.g., with three applications of lirotan or triscabol on 5th, 11th, and 25th June. A combination of lirotan and koneprox (each at 8 per cent.) reduced the incidence of seed infection by *A. brassicae* but not by *A. brassicicola*. Protracted rainy periods enhance the susceptibility of the shoots to infection by these two fungi, the conidia of the former species, in particular, germinating readily in a humid atmosphere. Necrotic lesions develop within a few days after infection by either species, though the clinical picture induced by *A. brassicae* agrees more closely with that of dark leaf spot than the symptoms caused by *A. brassicicola*. *A. tenuis* attacked mature pods in a moist atmosphere, but unripe ones and stalks were susceptible only after weakening by some other factor. *S. consortiale* was pathogenic to partially mature pods under conditions favouring conidial germination. For invasion by *B. cinerea* previous damage to the plants, e.g., through infection by *A. brassicae* or *S. consortiale* or insect injury, was essential.

LAMB (K. P.). **Field trials of five Swede varieties with special reference to aphid resistance.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 2, pp. 135–145, 1 fig., 4 graphs, 1953.

In tests at Auckland, Ashburton, and Lowcliff, New Zealand, carried out by the Plant Diseases Division, the swede varieties Calder, N.Z. Sensation, and N.Z. Resistant showed some resistance to aphids, supporting lower populations of *Brevicoryne brassicae*, *Myzus persicae*, and *Rhopalosiphum pseudobrassicae* than N.Z. Grandmaster and N.Z. Superlative. Those of the former group were also more resistant to turnip mosaic virus [*R.A.M.*, 28, p. 501] and soft rot [*Erwinia carotovora*: 16, p. 359], and were relatively high yielding even in wetter districts.

POUND (G. S.) & FOWLER (D. L.). **Fusarium wilt of Radish in Wisconsin.**—*Phytopathology*, 43, 5, pp. 277–280, 1 fig., 1953.

A destructive wilt of radish in Wisconsin, characterized by chlorosis, necrosis, and abscission of the foliage, vascular discoloration of the roots, stems, and petioles and marked stunting of the root, is attributed to *Fusarium oxysporum* f. *conglutinans* race 2 [*R.A.M.*, 31, p. 362 and below, p. 136]. In inoculation experiments the fungus, like the cabbage yellows pathogen (*F. o.* f. *conglutinans* race 1) [33, p. 71], attacked radish, ten-week stock (*Matthiola incana* [var. *annua*]), turnip, swede, rape, Chinese cabbage, cress [*Lepidium sativum*], mustard, and kohlrabi, but not cauliflower or kale and only occasional plants of broccoli, all of which were susceptible to race 1. Race 2 was pathogenic to cabbage only at the high soil temperatures of 28° and 32° C., but in general it was much more active than race 1 at 16° and 20°. Race 2 was most virulent at 24°. Little difference in susceptibility to wilt was observed among the commercial radish varieties tested, but resistant lines of Scarlet Globe have been developed by selection.

WATSON (D. J.) & WATSON (MARION A.). **Comparative physiological studies on the growth of field crops. III. The effect of infection with Beet yellows and Beet mosaic viruses on the growth and yield of the Sugar-Beet root crop.**—*Ann. appl. Biol.*, 40, 1, pp. 1–37, 47 graphs, 1953.

Further studies at Rothamsted Experimental Station demonstrated that infection with beet yellows virus [*R.A.M.*, 32, p. 295 and following abstracts] depressed the dry matter yield of sugar beet plants by reducing leaf area and net assimilation rate (mean rate of dry matter increase per unit leaf area). Reduction of this rate may be due to decreased rate of photosynthesis as a result of chlorosis or to changes associated with it. The evidence indicated that rate of photosynthesis may not be greatly reduced by infection; if so, the decrease in net assimilation rate indicates a large increase in respiration rate, especially of the root.

Late-sown plants with yellows had greater reduction of leaf area than early-sown ones, but reduction in the net assimilation rate was small; plants treated similarly in two successive years had the same reduction of leaf area but the net assimilation rate was much lower in the second. Most of the loss of dry matter was in the root; the leaf lamina was little affected.

Yellows much increased the reducing sugars in the lamina and caused smaller increases in sucrose and starch, these effects becoming apparent when the leaves displayed only etch symptoms. Increase in starch was greatest at this time, but the effect on the sugar content increased later, when yellowing developed. Yellows reduced the water content, nitrogen content, and area to weight ratio of the lamina; only the change in nitrogen content was due to the rise in carbohydrate. In the petiole and root the virus had no effect on the water content but increased the nitrogen. It reduced the sucrose content of the root, but loss of sugar yield was mainly due to decreased root weight.

Beet mosaic virus [31, p. 217] decreased the dry weight of the leaf and root of sugar beet plants only in the presence of nitrogenous fertilizer. It increased the nitrogen content of all those parts of plants which received no nitrogen, but not that of nitrogen-treated plants. It slightly increased the sucrose content of the root. Infection with mosaic at the end of June resulted in a 20 per cent. loss of sugar yield from plants given nitrogenous fertilizer, while yellows infection reduced it by 50 per cent.

WATSON (MARION A.) & HEALY (M. J. R.). **The spread of Beet yellows and Beet mosaic viruses in the Sugar-Beet root crop. II. The effects of aphid numbers on disease incidence.**—*Ann. appl. Biol.*, 40, 1, pp. 38–59, 16 graphs, 1953.

Multiple regression analysis of earlier data [*R.A.M.*, 31, p. 467] identified alate *Myzus persicae* of the spring and summer migrations as the chief factor affecting the spread of beet yellows virus in the sugar beet root crop in England [see preceding and next abstracts]. This was supported by the application of the following formula. Assuming that the crop is visited by N aphids at a time when the proportion of infected plants is k_0, the predicted proportion of infection for a time three to four weeks later is $k_1 = k_0 + 100(1-k_0)(1-e^{-NI})$, where $I = p\,[(1-k_0)^t + k_0 t - 1]/k_0$. This formula adequately accounts for the observed spread of infection when N is one-tenth of the sticky trap count for the three to four weeks preceding the time when k_0 infection is noted; p, the probability of infection by a single aphid is $\frac{1}{2}$; and t, the number of movements per aphid effective for spreading the virus, is 5.

Once infection had occurred in root crops in the spring, spread was mainly within fields or between fields in the same locality, though near concentrations of affected beet and mangold seed crops some infection was carried from them to the root crops by summer migrants. The greater prevalence of yellows virus in seed crop districts was due to the greater development of *M. persicae* in the root crops in these localities. The proportion of plants infected by spring migrants entering the root crops before the end of June was small and variable and did not vary significantly between seed and non-seed areas.

Beet mosaic virus [loc. cit.] spread mostly in the vicinity of seed crops within the seed-crop areas. No significant relation between aphid numbers and increase of infection was established, but the evidence strongly indicated that alatae of *M. persicae* and *Aphis fabae* spread the virus, their respective contributions being equal. This suggests that mosaic is not spread by aphid movement within the root crops, but only by infective migrants from outside. As the virus is non-persistent, outside sources must be near the root crops, and as internal spread is small many infective migrants are required to cause a high level of infection. Seed crops fulfil these conditions.

HULL (R.) & GATES (L. F.). **Experiments on the control of Beet yellows virus in Sugar-Beet seed crops by insecticidal sprays.**—*Ann. appl. Biol.*, 40, 1, pp. 60–78, 2 diags., 1953.

In field experiments at Dunholme Field Station near Lincoln and elsewhere from 1943 to 1950 it was found that *Myzus persicae* lived on sugar beet stecklings all through some winters and that most of the beet yellows virus infections [see preceding abstracts] in transplanted seed crops originated in the steckling bed. Stecklings sown at the end of July or early in August developed a higher proportion of infection than those sown about a month later; in one experiment sowings of 27th August had about 10 per cent. less infection than the 5th August ones.

Incidence of yellows was reduced by two sprays with 0·125 per cent. nicotine alone or in 1 per cent. Bordeaux mixture, which cleared the stecklings of aphids after the autumn migrations had ceased. Persistent and systemic organo-phosphorous insecticides gave greater reduction, three applications of E 605 (parathion)

in one experiment reducing incidence by nine-tenths, as compared with the unsprayed plots (9·6 per cent. yellows in the sprayed). E 605 also gave a mean increase in yield of 4·9 cwt. per acre over the unsprayed. In this experiment, with a mean yield of 17·24 cwt. per acre, an increase of 10 per cent. in the percentage of affected plants reduced yield by 0·88 cwt. per acre. In years when the stecklings were exposed to large migrations of aphids, however, even the best plots, sprayed three times with pestox 3 [*R.A.M.*, 31, p. 159], had 78 per cent. yellows, the figures for various formulations of parathion ranging from 81·4 to 88·9 per cent. Spraying in September and October was generally more effective than in August. It is concluded that insecticidal spraying, though it may be developed into a valuable control measure and may, in conjunction with other methods, give comparatively healthy crops, is unlikely to achieve complete control of beet yellows in open beds in years and areas in which many viruliferous aphids move during autumn.

Hartsuijker (K.). **De vergelingsziekte der Bieten. I. Samenvattend verslag over het onderzoek in de jaren 1940–1948.** [The yellows disease of Beets. I. Comprehensive report of the investigation during the years 1940 to 1948.]—*Meded. Inst. Suikerbiet, Bergen-o.-Z.*, 2, 275 pp., 5 pl., 8 graphs, 1952. [English and French summaries.]

This is an exhaustive, fully tabulated report of investigations from 1940 to 1948 on beet yellows virus in Holland [see next abstract], the principal results of which have already been noticed from another source [*R.A.M.*, 29, p. 132].

Rapport van de Commissie ter Bevordering der Suikenbietenteelt in de Noordelijke Provinciën over 1951. [Report of the Commission for the Promotion of Sugar Beet Cultivation in the Northern Provinces for 1951.]—*Meded. Inst. Suikerbiet, Bergen-o.-Z.*, 3, pp. 165–249, 6 graphs, 1 map, 1952.

The following items of phytopathological interest occur in this report (pp. 186–199). The percentage of beets affected by yellows virus on 70 plots in four regions of northern Holland [see preceding abstract] in 1951 was 9·9, compared with 0·5 in 1949 and 1·3 in 1950. Factors contributing to a high incidence of infection include late sowing, sparse stands, proximity of seed crops, and presumably a poor soil structure. Thus, the percentage of infection in stands sown in late April was 3·8 and at the end of May 6·4, while 13·7 per cent. of the plants in fields within 200 m. of seed crops contracted the disease as against 3 per cent. of those further away.

A few cases of manganese deficiency [cf. *R.A.M.*, 29, p. 394] were observed on heavy clay soils during a very dry spell in late June and early July. As soon as the symptoms appear, manganese sulphate should be strewn over the soil at the rate of about 30 kg. per ha., preferably in rainy weather, two applications being necessary; under dry conditions the plants should be sprayed ($\frac{1}{2}$ to $1\frac{1}{2}$ kg. per 100 l. water). Satisfactory results were also given by the early morning dusting of dew-laden plants with manganese sulphate, recuperation ensuing after $1\frac{1}{2}$ to two weeks.

Drachovská-Šimanová (M[iroslava]). **Virové choroby Cukrové Řepy.** [Virus diseases of Sugar Beet.]—*Preslia* (formerly *Studia bot. čechosl.*), 24, 2, pp. 113–188, 8 pl., 1 graph, 1 map, 1953. [Russian and English summaries.]

In this detailed survey of the most important viroses of sugar beet in Czechoslovakia [*R.A.M.*, 30, p. 553] it is stated that between 1946 and 1952 ten types of yellows were detected, though it is not assumed that they are all due to different strains of beet yellows virus [loc. cit.], but rather to various environmental influences

on and host reactions to the virus. Eight main symptom types of beet mosaic virus [loc. cit.] were discerned, some occurring concurrently on the same plant; it was again very widespread, the average loss of yield caused by the disease from 1949 to 1951 being 16 per cent. and for yellows 25 per cent. In 1950 and 1951 five types of leaf deformity, including leaf curling reminiscent of curly top, were noticed. Descriptions are given of two new diseases, 'sterile curly top' of seedlings and 'sterile spinach form' or stunting of seed plants. Albication [? chlorosis] does not appear to be of virus origin.

An approximate correlation was established between the widespread distribution of aphids (*Aphis fabae*) and virus incidence. The migratory aphids which colonize stecklings in the autumn appear to be the most dangerous [see preceding abstracts].

In inoculation experiments yellows symptoms did not appear on shaded parts of the leaf. No antagonism was observed between virus diseases and fungi on beet leaves but usually their harmfulness was increased by association, *Peronospora schachtii* [C.M.I. map No. 28] being the only exception. It is of the utmost importance to leave a minimum distance of 1,000 to 1,500 m. between seed plants and stecklings and commercial sugar beets. Higher yields and lower polarization were characteristic of beets from seed cultivated for two years at higher altitudes. The use of stecklings from regions with smaller aphid populations and the production of seed at higher altitudes are not recommended and should be practised only when it is not possible to check the spread of virus diseases by the normal control methods or to allow 1,000 m. between the crop and an infection source.

A spray of 0·75 per cent. pestox 3 gave good control of the vectors, though before dying they could still transmit mosaic more than yellows. There is a bibliography of 575 titles.

Tochinai (Y.) & Sawada (K.). **Studies on varietal susceptibility of Beans to Colletotrichum lindemuthianum Briosi & Cavara. II. Observations on invasion of fungus and its development.**—*Ann. phytopath. Soc. Japan*, 17, 2, pp. 49–53, 4 figs., 1953. [Japanese, with English summary.]

Further studies in this series [cf. *R.A.M.*, 32, p. 464] were concerned with the process of infection by the D-strain of the anthracnose fungus, *Colletotrichum lindemuthianum*, in the susceptible bean [*Phaseolus vulgaris*] varieties Tenashi-naga-uzura and Hon-Kintoki, the resistant varieties Tenashi-chunaga-uzura, Satisfaction, and Indian Chief, and the highly resistant Beni-Kintoki and O-tebo.

The susceptible ones developed no marked symptoms until the mycelium had spread widely in the tissue, large, sunken, reddish-brown lesions with numerous acervuli eventually appearing; the resistant varieties produced similar but very small lesions. Beni-Kintoki and O-tebo had no macroscopic symptoms; a few cells turned brown. Appressorial formation and hyphal invasion occurred equally on both susceptible and resistant varieties. Marked changes in the protoplasm of the three resistant varieties took place rapidly following hyphal invasion, the cells browning quickly round the point of infection.

Lehman (S. G.). **Race 4 of the Soybean downy mildew fungus, Peronospora manshurica.**—Abs. in *Phytopathology*, 43, 5, p. 292, 1953.

The results of greenhouse tests in the spring of 1952 demonstrated the existence in North Carolina of another physiologic race, designated race 4, of *Peronospora manshurica* in addition to the three differentiated by Geeseman [*R.A.M.*, 31, p. 45]. Young plants of 20 varieties (including the seven used by Geeseman) were inoculated with conidia from infected Roanoke seedlings. Race 4 failed to attack any of the varieties used for the separation of races 1 to 3 but caused severe infection on Roanoke, Rokusun, and N48–1867 and mild symptoms on Acadian and

Woods Yellow. It was innocuous to Dorman, CNS, Patmetto, Ogden, Rose Non Pop, Ralsoy, and N49–2370.

IIDA (W.). **Studies on Soy-Bean anthracnose.**—*Forsch. PflKr., Kyoto*, 4, pp. 169–173, 1951. [Japanese, with English summary. Received 1952.]

The causal fungus of soy-bean anthracnose, *Glomerella glycines* [*R.A.M.*, 31, p. 458], was isolated from diseased pods by the author at Kyoto, Japan. The optimum temperature for growth in culture was 28° to 30° C. and the range 4° to just over 40°. Conidia of this isolate failed to germinate at a relative humidity below 95 per cent., while the optimum temperature range for germination was between 26° and 32°. The hyphae of *G. glycines* were able to overwinter in diseased pods. In inoculation tests only the pods, particularly young ones, were susceptible to infection.

VASUDEVA (R. S.) & SRINIVASAN (K. V.). **Studies on the wilt disease of Lentil (Lens esculenta Moench).**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 23–32, 1953.

The incidence of *Fusarium* wilt of lentil (*F. orthoceras* var. *lentis* n.var.) [cf. *R.A.M.*, 31, p. 539] at the Indian Agricultural Research Institute, New Delhi, reached 67 per cent. in some lines in 1949. In a broadcast crop the disease occurs in isolated, more or less circular patches which enlarge as the season advances; in row crops it progresses along the lines. Leaf-curling extends upwards, the crown droops, and the plant dies. The root system is poorly developed and all or some of the roots are discoloured brown. In early infection the tap root is stunted and destroyed at the tip, secondary roots proliferating in a cluster above the affected level. The walls of some of the xylem vessels in the root are discoloured brown and contain fungal hyphae.

Good growth typical of *F. orthoceras* was obtained on potato plugs, bean pods, and rice. The new variety is based on its specific pathogenicity for lentil. On potted, inoculated lentil plants the disease was favoured by soil temperatures ranging from 17° to 31° C. Wilt incidence was 100 per cent. in sand alone, 10 per cent. in soil, and intermediate in sand-soil mixtures.

CROXALL (H. E.), SIDWELL (R. W.), & JENKINS (J. E. E.). **White rot (Sclerotium cepivorum) of Onions in Worcestershire with special reference to control by seed treatment with calomel.**—*Ann. appl. Biol.*, 40, 1, pp. 166–175, 1953.

In Worcestershire heavy losses of salad onions from white rot (*Sclerotium cepivorum*) [*R.A.M.*, 28, p. 345; 31, p. 195 and next abstract] occur on land that has not before carried a susceptible crop. The reason for these outbreaks has not yet been ascertained. Seed-borne infection is unlikely, as the disease may occur in rectangular patches at right angles to the line of drilling. In a careful examination of nearly 100 samples of seed no infection was detected, and it seems unlikely that sufficient infected seed or sclerotia could be present in a sample to cause an almost complete loss of crop. The wild onion (*Allium vineale*) is susceptible, but in some outbreaks this weed was not present. No evidence was found of infection being introduced on tools or on the soil clinging to seedling roots of a previous crop transplanted on to the ground. The available evidence suggests that either the fungus has a wider host range than the onion family or it exists as a soil saprophyte. Leeks are rarely attacked, though grown on the same sites as onion and at a similar time of the year.

During five seasons good control resulted from seed treatment with pure calomel applied with a resin-alcohol sticker. In one large-scale experiment on heavily contaminated soil half the untreated plants were completely destroyed by the disease by October, half the remaining plants being infected, but there was no disease on 2 acres sown with treated seed (⅔ lb. calomel per lb. seed). In the following spring

the treated seed averaged 48 healthy and 0·2 diseased plants per yard of drill, as against nine and 12, respectively, among the surviving untreated plants. In another experiment on old market-garden land also known to be heavily contaminated, calomel (at 1, ¾, and ½ lb. seed) gave, respectively, 68·9, 52·4, and 46·1 healthy plants and 4·3, 4·2, and 10·3 diseased per yard of drill (mean numbers), the figures for the untreated being 9·3 healthy and 18·9 diseased. In a third experiment calomel (1 lb.) gave 72 healthy (7·5 tons per acre) and 6·3 infected seedlings per yard of drill, the corresponding figures for a 70 per cent. application being 43·6 (5·1) and 13·3, and for the untreated 5·9 (1·3) and 8·9. Calomel also gave some control of seedling damping-off (*Corticium solani*). In one season calomel seed treatment of bulb onions gave promising results.

CROXALL (H. E.) & HICKMAN (C. J.). **The control of Onion smut (Urocystis cepulae) by seed treatment.**—*Ann. appl. Biol.*, 40, 1, pp. 176–183, 1953.

In a field trial near Evesham, Worcestershire, in 1944 dust treatment with ferbam and 50 per cent. thiram applied (w/w) with a resin-potash sticker to Bedfordshire Champion onion seed sown in soil which had carried a previous crop severely infected by smut (*Urocystis cepulae*) [*R.A.M.*, 29, p. 222] gave, respectively, 5·4 and 4·2 healthy and 0·02 and 0·03 infected seedlings per foot of drill, as against 2·1 healthy and 0·14 infected seedlings for the untreated. In a second trial on the same site with Ebenezer seed the same two treatments gave, respectively, 6 and 5·7 healthy and 0·05 and 0·06 infected plants, the corresponding figures for the untreated seed being 2·85 and 0·45. Chloranil gave some control but reduced emergence. Greenhouse trials confirmed these results, but control was less effective at high levels of infection.

It is concluded that these treatments provide a simple means of reducing infection on land frequently cropped with onions. If white rot (*Sclerotium cepivorum*) [see preceding abstract] is also present in the soil, the possibility of a combined seed treatment might be considered.

MUNGER (H. M.) & NEWHALL (A. G.). **Breeding for disease resistance in Celery and cucurbits.**—*Phytopathology*, 43, 5, pp. 254–259, 1953.

On the basis of 41 contributions to the literature [many of which have been noticed from time to time in this *Review*], the authors discuss two aspects of breeding celery and cucurbits for resistance to specific diseases, namely, the best sources of resistance for use in a breeding programme and the possibilities of transferring resistance from one variety to another.

WALKER (J. C.), PIERSON (C. F.), & WILES (A. B.). **Two new scab-resistant varieties.**—*Phytopathology*, 43, 4, pp. 215–217, 1953.

In a breeding programme initiated at the Wisconsin Agricultural Experiment Station for the development of resistance to scab [*Cladosporium cucumerinum*] in pickling cucumbers [*R.A.M.*, 32, p. 360], Maine No. 2 was used as the resistant parent. After the isolation of homozygous F_3 progenies from a cross between Maine No. 2 and National Pickling, three successive back-crosses to the latter variety were made. Plants of the first back-cross were crossed with Chicago Pickling and back-crossed to it twice. Resistant plants in each segregating progeny were selected after inoculation in the seedling stage under the most favourable conditions for disease development. From each back-cross homozygous resistant progenies were evaluated in field trials for agronomic qualities. These studies culminated in the selection, increase, and release of Wisconsin SR 6 [loc. cit.] and Wisconsin SR 10, the former resembling National Pickling and the latter Chicago Pickling; both are resistant to scab.

IWATA (Y.). **Specialization in Pseudoperonospora cubensis (Berk. & Curt.) Rostow. (III) Studies on the fungus from White Gourd (Benincasa hispida Cogn.)**—*Forsch. PflKr., Kyoto*, 4, pp. 124–128, 1951. [Japanese, with English summary. Received 1952.]

The pathogenicity and morphology of isolates of *Pseudoperonospora cubensis* from white gourd (*Benincasa hispida*) were compared [at Mie University, Japan] with those from cucumber [*R.A.M.*, 31, p. 102] and squash (*Cucurbita moschata*). On white gourd infection occurs mainly on the mature leaves. The spots are yellow, irregular in outline and somewhat water-soaked at the margin. The gourd strain differs from cucumber isolates in its pathogenicity to squash, which was immune from the latter. In morphology the two were similar; the conidiophores of the gourd strain were longer than those on squash. The mildew on white gourd appears to be a distinct biologic race of *P. cubensis*.

HARE (W. W.). **A new race of Fusarium causing wilt of Cowpea.**—Abs. in *Phytopathology*, 43, 5, p. 291, 1953.

In connexion with the Mississippi breeding programme for the incorporation of resistance to *Fusarium* wilt in popular cowpea varieties inoculation experiments were performed with a collection of isolates from the State, which were classified as physiologic races 1 and 2 of *Fusarium conglutinans* [see above, p. 130] on the basis of the reactions of Groit and Extra Early Blackeye. Thus, the former was killed by race 1, but not the latter, while race 2 was lethal to Extra Early Blackeye but not to Groit. However, some isolates referred to race 2 on these grounds were more injurious to varieties normally partially resistant to typical strains of that race and they killed Arlington, which did not succumb to races 1 or 2. Because of these anomalies it is proposed to designate this group of isolates as race 3 of *F. conglutinans* [*R.A.M.*, 31, p. 362].

PURSS (G. S.). **Stem rot of Cowpeas.**—*Qd agric. J.*, 77, 3, pp. 139–142, 4 figs., 1953.

Early in 1952, shortly after cowpea stem rot caused by a species of *Phytophthora* [cf. *R.A.M.*, 28, p. 505] had been reported from northern Queensland, severe outbreaks of this disease occurred in the Fassifern and Lockyer Valleys, the Darling Downs, and the areas round Gympie and Kilcoy in southern Queensland. The disease recurred in the 1952–3 season, causing considerable damage in many localities. The first indication of the disease in the field is the appearance of yellow patches which extend rapidly, not uncommonly involving the whole crop. In dry weather diseased plants wilt rapidly and die. A light brown area, girdling the stem at first, extends upwards, even to the tip, with watersoaked tissue in advance of the discoloration. Under very damp conditions the upper parts may be attacked before the collar. The root system is completely disorganized. Plants approaching flowering are most readily attacked but seedlings following an infected crop are often diseased. Rotation should be practised where feasible, a period of at least two seasons without cowpeas being advisable, but the best method of control is to plant resistant varieties, such as Cristando (highly resistant) or Giant (moderately so), as the two commonly grown varieties, Poona and Reeves, are very susceptible. Search is being continued for a completely resistant variety.

KULKARNI (Y. S.), PATEL (M. K.), & ABHYANKAR (S. G.). **A new bacterial leaf-spot and stem canker of Pigeon Pea.**—*Indian Phytopath.*, 5 (*1952*), 1, pp. 21–22, 1 fig., 1953.

Much of this information concerning *Xanthomonas cajani* on pigeon pea in Bombay has already been noticed [*R.A.M.*, 31, p. 5]. In inoculation experiments only pigeon pea was attacked, the varieties 1 to 12, F.18, and F.52, from Anand,

M.4-N, M.4-E, M.4-5 from Arbhavi, Erect-C 47, Lonavala C-265, Matheran C-262, Kundal C-203, Kundal C-267, and Malawali being susceptible.

Stoner (W. N.). **Pierce's disease virus infection, a cause of Grape degeneration in Florida.**—Abs. in *Phytopathology*, 43, 5, p. 293, 1953.

In grafting experiments in Florida to test for the presence of Pierce's disease [lucerne dwarf] virus [*R.A.M.*, 31, p. 47; 32, p. 537], healthy vines, chip-grafted in the greenhouse from degenerate specimens in the autumn of 1951, developed initial symptoms of the trouble during the following summer, and by the autumn of 1952 their condition was closely reminiscent of Pierce's disease. Symptoms identical with those of lucerne dwarf developed on healthy vines and lucerne colonized by *Carneocephala flaviceps*, which had been feeding either on degenerate material or on Bermuda grass [*Cynodon dactylon*] near affected vines. Thus, the etiological connexion between lucerne dwarf virus and Florida vine degeneration appears to be established; *Carneocephala flaviceps* is a hitherto unrecorded vector.

Hyams (E.). **Three new varieties of Grape.**—*Gdnrs' Chron.*, Ser. 3, 134, 3487, p. 180, 1953.

Descriptions are given of two new vine hybrids, Tissier-Ravat 578 from France and Madeleine × Sylvaner from Landau Research Station, Rhineland, Germany. As they are so highly resistant to [unspecified] fungus diseases they are treated in England as immune and receive no sprays.

Peyer (E.) & Huber (H.). **Die Imprägnierung von Rebstecken.** [The impregnation of Vine stakes.]—*Schweiz. Z. Obst- u. Weinb.*, 61, 25, pp. 514–517, 1 fig., 1952.

Copper sulphate at concentrations of 2·5 for green and 3 per cent. for dry wood was the most effective of the fungicides tested for the impregnation of vine stakes at the Wädenswil Experiment Station, Zürich, Switzerland, conferring the maximum degree of protection at the lowest cost over a 12-year period. The bases of the stakes are immersed in troughs or barrels on the sunny side of the buildings, using 1 l. solution per length of 2·2 m., which should be completely absorbed before removal. After treatment drying for six months to a year is essential for green wood.

Marchionatto (J. B.). **Antocianosis de la Vid.** [Anthocyanosis of the Vine.]—*Rev. argent. Agron.*, 20, 3, pp. 156–157, 1953.

Vine mildew (*Plasmopara viticola*) occurred in epiphytotic proportions in the vineyard of the Faculty of Agronomy and Veterinary Science, Buenos Aires, Argentina [*R.A.M.*, 28, p. 617], during the summer of 1953. The accompanying red anthocyanin pigmentation, present only at the lowest soil levels, was found to be due to high acidity, low potassium content, and, above all, poor workability. The condition may be alleviated by a heavy application of fertilizers.

Viennot-Bourgin (G.). **Notes de pathologie végétale (année 1951).** [Notes on plant pathology (year 1951).]—*Ann. Inst. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 3, 4, pp. 527–533, 5 figs., 1952.

Cherry leaves from the vicinity of Montpellier in 1951 were infected by *Cercospora cerasella* [cf. *R.A.M.*, 16, p. 20], which appears to be spreading in southern France. Very occasionally *Coryneum beijerinckii* [*Clasterosporium carpophilum*] was also present, and more commonly *Oospora* sp. and the conidial state of *Anthostomella pullulans* [cf. 8, p. 68], which tends to form masses of brown mycelium resembling miniature sclerotia on tissues already rendered necrotic by *Cercospora cerasella*.

In March, 1951, mature leaves of *Cattleya* sp. in a glasshouse near Paris developed

infection, particularly at the tip, by a species of *Colletotrichum*. The infected part was black and silky, and sharply delimited from the healthy tissue. Infected leaves were completely destroyed in less than a month, after which the fungus remained confined to the sheath. In culture colonies were deep brown and hirsute. The variable, hyaline conidia, mostly ovoid or cylindrical and rounded at the extremities, averaged 10·18 by 3·6 μ.

Alopecurus pratensis growing near Versailles developed leaf spot caused by *Mastigosporium album* [cf. 30, p. 584]. Favoured by dew or rain the conidiophores and conidia develop even at 5° [C.], though not in dry weather or in sunlight.

Begonias were attacked by *Oidium begoniae* [31, p. 329] in several horticultural establishments near Paris. At Versailles, in particular, there was appreciable damage to greenhouse plants under conditions of poor light, a constant temperature of about 15°, and high humidity. In hairy varieties it is difficult to detect the disease promptly enough for early treatment. Control depends on improving the ventilation and spraying with 0·2 per cent. copper oxychloride in a suspension of white oil.

Stagonospora curtisii [cf. 30, p. 322] developed on *Amaryllis belladonna* during the entire period of growth near Paris and in Anjou in September, 1950 and 1951. Infection is favoured by excessive humidity and a high day temperature, followed by a marked drop at night with copious condensation. In glasshouses infection develops actively at about 22°. The bulbs should be cleaned and all infected scales removed, after which they should be dusted with wood ash, or given hot-water treatment two days before forcing (40° for 30 minutes), or steeped for 2 hours in mercuric chloride solution (1 per 1,000) or formalin (1 per cent.). This should be followed by spraying the plants with 1 per cent. Bordeaux mixture plus an adhesive, but this is ineffective unless the bulbs have been properly cleaned.

In October, 1951, abundant perithecia of *Uncinula necator* were present on a Chasselas grape vine growing at Versailles. Very rainy weather had prevailed, with rather low average daily temperatures.

Schreier (O.). **Das Auftreten wichtiger Krankheiten und Schädlinge an Kulturpflanzen in Österreich im Jahre 1952.** [The occurrence of important diseases and pests on cultivated plants in Austria in the year 1952.]—*PflSchBer.*, 10, 1–2, pp. 15–20, 1953.

The weather conditions prevailing in Austria during 1952 [cf. *R.A.M.*, 31, p. 536] did not favour the development of fungal diseases. The few important records mentioned in this paper have already been noticed from separate contributions.

Report of the Director of Science Service, Canada Department of Agriculture, for the year ended March 31, 1952.—51 pp., 4 pl., 1952.

In the Plant Science section of this report (pp. 10–34) [cf. *R.A.M.*, 31, p. 49; 32, p. 664] the results of the first systematic forest disease survey [32, p. 518] are given. Die-back of white birch shoots and branches was found to be associated with damage by the birch shoot borer [*Epinotia salicitana*] and the fungus *Melanconium bicolor* [30, p. 18]. In Nova Scotia decay of red spruce is of less importance than that of white spruce or balsam fir [*Abies balsamea*: 33, p. 60]. In New Brunswick a similar study on white spruce showed that [unspecified] butt rots were responsible for 80 per cent. of the total cull caused by decay. In a study of root-wounding in relation to infection of spruce by wood-rotting fungi carried out in Saskatchewan and Manitoba one of the most important wounding agents was a bark tunnelling insect.

The northward spread of race 15B of wheat stem rust [*Puccinia graminis*: 32, p. 672] in Western Canada in 1951 was retarded by unfavourable weather conditions. Tests at Winnipeg in 1951 showed that, although none of the wheats now grown commercially in North America is resistant to this race, there are in existence many resistant varieties which could be used as breeding material [loc. cit.].

Studies have established that most of the natural inoculum of *Helminthosporium sativum* [32, p. 664] accumulates on the soil surface and may be moved about by water and wind. Consequently, ploughing should turn under this inoculum and reduce root rot infection in the crop. When albino and dark haploid isolates of *Cochliobolus sativus*, the perfect state of *H. sativum* [31, p. 179], were paired in culture both black and white perithecia were obtained. It appeared that the factors for colour and compatibility are inherited independently. Studies on the inheritance of pathogenicity factors have so far proved inconclusive. Isolates of *H. sativum* from wheat affected by root-root [32, p. 664] generally proved more virulent than those of *Fusarium* spp. [30, p. 307; 31, p. 597] in greenhouse tests. *F. culmorum* appears to be a more serious pathogen of wheat in the Peace River area than in central Alberta.

Barley false stripe virus [32, pp. 543, 674] is cross-transferable between wheat and barley by manual inoculation, causing a systemic infection in both hosts.

A survey conducted in Prince Edward Island in 1951 revealed that over 10 per cent. of the growers applied no fungicide for the control of potato blight [*Phytophthora infestans*: 32, pp. 543, 665], and many who did spray provided inadequate protection. In consequence it was estimated that the crop was reduced by nearly 1,000,000 bush. because of premature defoliation.

The causal organism of black rot of carrots, *Stemphylium radicinum* [31, p. 53], may overwinter in field debris from crop plants. The percentages of plants free from petiolar and root infections at harvest, depending on the fungicides used, were: manzate, 47; neutro-cop '53', 32·6; thiram slurry, 22·7; ferbam, 22·3; dithane Z-78, 21·6; potassium permanganate, 11·2; and the untreated control, 9·2 per cent.

The development of pea varieties resistant to *Ascochyta pisi* [cf. 32, p. 229], one of the most serious pathogens of peas in Canada, is complicated by the existence of at least ten physiologic races [31, p. 268].

Inoculation experiments with the causal organism of crown rot of apple trees, *P. cactorum* [32, p. 666], showed that Malling IV apple stock, Bartlett pear, *Pyrus robusta*, and Mahaleb cherry seedlings were resistant, and Gold cherry seedlings susceptible. The fungus was isolated for the first time from a naturally infected sweet cherry tree. More than one-third of the trees in the sour cherry orchards and 60 per cent. in sweet cherry surveyed in the Niagara peninsula in 1951 were found to be virus-infected [32, p. 135], mostly with cherry yellows [33, p. 35] and necrotic ring spot. In sweet cherry orchards mild mottle patterns predominated. Symptoms of little cherry virus [32, p. 666] are masked in Van cherry.

Experimental inoculations have demonstrated that Himalaya blackberry [*Rubus procerus*] and loganberry plants are very susceptible to *Agrobacterium* [*Bacterium*] *rubi* [30, p. 209], but numerous inoculations with *A.* [*B.*] *tumefaciens* failed to produce galls. A characteristic symptom of the disease in Himalaya blackberries is the successive development of galls at the nodes for a considerable distance up the fruiting canes, indicating that the causal organism migrates within the canes.

White pine blister rust (*Cronartium ribicola*) [32, p. 519] was prevented from defoliating black currants in Nova Scotia by two applications of phygon timed to prevent initial infection from white pine.

New disease records for 1951 [cf. 32, p. 543] were white rot (*Sclerotium cepivorum*) on garlic, and root and stem-rot of soybeans caused by *Pythium ultimum*.

Bacteriophages may be isolated from parts of the plant other than the seed. In 1951 oat leaves from near Winnipeg yielded a bacteriophage capable of lysing *in vitro* both *Pseudomonas coronafaciens* [32, p. 617] and *P. striafaciens*.

Twenty-sixth Annual Report of the Department of Scientific and Industrial Research, New Zealand, 1952.—84 pp., 1952.

In the section of this report [cf. *R.A.M.*, 31, p. 319] dealing with the work of the

Crop Research Division (pp. 14–17) E. J. Godley states that infection by potato virus X was confirmed in all the stocks of Aucklander Short Top [32, p. 334] and Dakota Red. None of the Arran Chief crops examined at Tuatapere was virus-free, though many were very low in virus content. Blight (*Phytophthora infestans*) [32, p. 501] was observed at Pukekohe on Scottish and American potato varieties which were hitherto considered immune, indicating the presence of a second strain of the fungus in the district. Some lines of the swede variety Wilhelmsburger Otofte showed a promising degree of resistance to dry rot [*Phoma lingam*: 32, p. 656].

From the Fruit Research Station J. D. Atkinson records (pp. 38–40) that virus-like symptoms, probably due to several viruses, were widespread on cherries and plums but comparatively rare on peaches and apricots in Central Otago.

G. H. Cunningham reports from the Plant Diseases Division (pp. 58–62) that although some strawberry varieties are fairly resistant to black root rot caused by several fungi [32, p. 388], losses from this disease were comparable with those caused by red core [*Phytophthora fragariae*: loc. cit.]. The host range of *Verticillium* wilt (*V. albo-atrum* [33, p. 70] and *V. dahliae*) now includes 31 different species in New Zealand. Selections of Greenfeast peas showed promising resistance to wilt [*Fusarium orthoceras* var. *pisi*: 32, p. 415]. A species of *Phytophthora* causing collar-rot was isolated from *Gerbera*, *Phebalium*, *Podylaria*, and *Erica*. A prior infection of swedes with bacterial black rot [*Xanthomonas campestris*: 18, p. 234] or turnip mosiac virus [33, p. 130] markedly increased their susceptibility to soft rot [*Erwinia carotovora*: loc. cit.]. Phenyl mercury salicylate applied as an aerosol was effective against tomato leaf mould [*Cladosporium fulvum*: 30, p. 20]. Apple mildew [*Podosphaera leucotricha*: 30, p. 177] was controlled by phenyl mercury chloride, which was also effective, as well as sulphurs, ferbam, and thiram, against black spot [*Venturia inaequalis*: loc. cit.] and bitter rot [*Glomerella cingulata*: 18, p. 235]. Dichloronaphthoquinone and thiram were promising against peach brown rot [*Sclerotinia fructicola*: 28, p. 378], as was thiro dust (50 per cent. seed weight) against onion smut [*Urocystis cepulae*: 32, p. 656].

It is stated on pp. 67–68 that further positive transmissions of virus symptoms were obtained from some imported cuttings of Wye hop varieties at the Hop Research Station. Various abnormalities were observed in hop growth in commercial gardens [cf. 30, pp. 20, 22]. An incurling of leaf margins associated with reduced yields, possibly of virus origin but differing somewhat from known viruses, was successfully transmitted to young nettle [*Urtica*] plants but not to healthy hops. Varying resistance to black root rot (*Phytophthora* [*cactorum*: 33, p. 69]) was observed in seedlings of commercial varieties.

In the section on microbiological work at Canterbury Agricultural College (p. 81) I. D. Blair reports that the most severe effects of blind seed disease (*Phialea temulenta*) of rye grass [*Lolium* spp.: 32, p. 317] were avoided in a second season when field sowings were isolated from other sources of infection. Tomato stem canker (*Didymella lycopersici*) [cf. 31, pp. 564, 635; 32, p. 608], a new record for Canterbury, was severe in commercial plantings.

Department of Agriculture, Kenya, Annual Report 1950. Vol. II.—186 pp., 1952.

In the report of the senior plant pathologist (pp. 72–77) [cf. *R.A.M.*, 31, p. 173] R. M. Nattrass states that *Nigrospora oryzae* caused a dry rot of maize cobs [cf. 31, p. 460]. Perenox spray applied against bud disease (*Ramularia bellunensis*) [33, p. 16] did not reduce the pyrethrin content of pyrethrum [*Chrysanthemum cinerariifolium*] or interfere with assay. Fungi isolated from root and crown rots of pyrethrum included *Fusarium* spp., *Sclerotinia sclerotiorum*, and *S. minor*, while *Coniothyrium* sp., *Microdiplodia* sp., and *Botrytis cinerea* were found on the buds and flowers.

Diseases of herbage included *F. graminearum* [*Gibberella zeae*] on heads of *Pen-*

nisetum glabrum, 25 per cent. of the florets being infected, *Ustilago cynodontis* on *Cynodon dactylon*, *Beniowskia sphaeroidea* on *P. polystachyon*, *Puccinia graminis* f. on *Dactylis glomerata*, and *Phyllachora digitariae* on *Digitaria* sp. *Cynodon* grass at two Nairobi golf clubs was infected in patches by *Helminthosporium cynodontis* [cf. 32, p. 131], control being effected by means of a mercurial dressing. Lucerne was attacked by *Peronospora trifoliorum*, *Uromyces striatus*, *Pseudopeziza medicaginis*, and *Sphaerulina trifolii*. Peas were generally infected by *Ascochyta pisi* and *Erysiphe polygoni*. Flax grown at an altitude of 9,000 ft. suffered losses from attack by 'pasmo' (*Sphaerella* [*Mycosphaerella*] *linorum* and *Phoma linicola*) [30, p. 309]. Sunflowers were severely affected by *Puccinia helianthi* [loc. cit.] and *Cystopus tragopogonis* [loc. cit.]. *C. candidus* was present on a crop of Indian colza. *Tephrosia candida* was defoliated by *Cylindrosporium tephrosiae* [cf. 23, p. 409]. Minute nodules on roots of tea seedlings contained a yeast-like fungus [cf. 33, p. 54]. *Septoria apii-graveolentis* was common on celery, and chicory was affected by tip blight due to *Botrytis cinerea* and a tap-root canker associated with *Alternaria tenuis*. Cucumber was attacked by *Pseudoperonospora cubensis* [28, p. 620; 29, p. 89]. Potato and tomato blights (*Phytophthora infestans*) [30, p. 308] were widespread, tomatoes suffering considerable destruction; in one instance *A. solani* [cf. 28, p. 31; 29, p. 89] caused a severe canker of tomato seedlings at soil level. The sclerotial form of *Septoria gladioli* occurred on gladiolus corms. *Armillaria mellea* was present on bananas.

In the report of the senior plant breeder (pp. 94–118), H. C. Thorpe, it is stated that the wheat variety 294.M was susceptible in seedling tests to race K9 of stem rust (*Puccinia graminis*), the most prevalent race in Kenya and Tanganyika Northern Province [33, p. 77], while 318.*A*J.4.*A*.1 and 360.H were resistant. Both *P. graminis* and *P. glumarum* were more abundant than usual, the latter at altitudes over 7,000 ft. *Ophiobolus graminis* [30, p. 308] was present in the higher areas, particularly above 8,000 ft., and yields were reduced in fields where rotation had not been practised. One field of 261.R wheat was badly affected by scab (*F. graminearum*) [*G. zeae*], an uncommon disease in Kenya [cf. 31, p. 226].

In the annual report of the plant pathologist and physiologist, Coffee Services (pp. 128–137), R. W. Rayner concludes from three years' experiments with sprays on coffee bushes to reduce [physiological] leaf fall that non-copper sprays are as efficient as copper-containing ones. As yet there has been little effect on yield. Coffee leaves appear to become infected with the yellow leaf spot fungus [31, p. 173] at an early age, perhaps during the first ten weeks. It takes five to 25 weeks for the infection to become visible, and from 16 to 40 for severe symptoms to develop. Sections of small warty or blister-like excrescences found on Kenya Selected berries showed that the cells three or four layers beneath the surface were swollen. From the margin of the blister copious mycelium usually penetrated obliquely from the epidermis and reached the enlarged cells. A little below the apparent point of invasion abundant mycelium was present and here the cells had disintegrated. The whole appearance resembled that of the yellow leaf spots. Mottled areas on ripening coffee cherries also appeared to be associated with fungal invasion.

In the horticulture section (pp. 156–169) T. H. Jackson reports that the Oberschlesien strawberry variety has proved a failure in Kenya owing to its susceptibility to leaf spot [*Mycosphaerella fragariae*: 30, p. 309], whereas Huxley M.44 is only slightly susceptible.

Jagoe (R. B.) & Henderson (R.). **Notes on current investigations, April to June, 1953.**—*Malay. agric. J.*, 36, 3, pp. 190–200, 1953.

In this report [cf. *R.A.M.*, 32, p. 367] it is stated that during germination tests to detect diseases in rice grain in Malaya *Trichoconis padwickii* [31, p. 628] was most frequently encountered. *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: 29, p.

12] also developed and sporulated, indicating that infected seed may often be responsible for early outbreaks in nurseries.

The sources of cacao red rot (*Ganoderma pseudoferreum*) [32, p. 367] infection in plantings at the Federal Experiment Station, Serdang, were a jungle stump and a length of infected root which had been dropped on the surface of the soil near a cacao tree.

In spite of treatment with DD soil fumigant and crop rotation against tomato bacterial blight (*Xanthomonas* [*Pseudomonas*] *solanacearum*) [30, p. 509] serious damage occurred in all tomato crops grown during the quarter, indicating that control measures adequate during drier weather are not effective in the wetter periods of the year.

Report of the Iowa Agricultural Experiment Station for the two years July 1, 1949 to June 30, 1951 (Part I).—74 pp., 70 figs., 1 diag., 3 graphs, 5 maps, 1951.

The following items in this report [cf. *R.A.M.*, 30, p. 311] are of phytopathological interest.

The value of growing improved, disease resistant oat varieties in Iowa in 1948, 1949, and 1950 is estimated at over $117,000,000. H. C. Murphy and his associates have found a backcross of Clinton and Santa Fe which appears to possess all the desirable characteristics of Clinton combined with the Santa Fe type of resistance to race 45 and other races of crown rust [*Puccinia coronata*: 32, pp. 371, 675].

Soy-bean stem canker [*Diaporthe phaseolorum* var. *batatatis*: 31, p. 268] cost Iowa growers nearly $4,000,000 during 1950. J. Crall and his co-workers discovered that 15 out of 189 lines tested were considerably more resistant than Lincoln in both the 1949 and 1950 trials. Brown stem rot [*Cephalosporium gregatum*: loc. cit.] was also prevalent in eastern Iowa during this period. Crop rotation offers the most practicable method of control.

C. S. Reddy states that the cost of treating maize seed [32, p. 372] is only ½ per cent. of the gain in yield, which averaged 3·74 bush. per acre in 5,830 paired lots in 13 years' experiments. Ceresan M [32, p. 549] and new improved ceresan increased yields of Cherokee oats by an average of 5½ bush. per acre over the 28 control plots. C. S. Reddy and R. E. Atkins obtained average increases in flax yields of 3½ bush. per acre with ceresan M and not quite half this with panogen.

C. S. Reddy and A. F. Sherf increased field stands of Hawkeye soy-beans by 6 per cent. by seed treatment with arasan [33, p. 64] and 7 per cent. with spergon [32, p. 659], representing yield increases of only 1 and 0·3 bush., respectively, over the untreated. The addition of [bacterial] inoculum [loc. cit.] to untreated seed increased the yield by only 0·3 bush., that is, to about the same level as for treated inoculated seed. Of 16 lots of Adams soy-beans given seed treatment six, four, and one lot showed increased [? stands] on an average by 7·9, 24·7, and 36·4 per cent., respectively. Five lots did not benefit. Of 18 lots of lucerne seed treated five showed stand increases of 23·6 per cent. and seven of 66 per cent., but 18 lots of red clover gave hardly any response in two greenhouse tests.

By exposing potato seedlings to late blight [*Phytophthora infestans*] infection in flats W. J. Hooker and C. E. Peterson demonstrated that most of the susceptible ones are killed outright, less than 10 per cent. of the survivors being escapes from infection. By this method of early testing it was possible to secure for field trials progenies in which at least 90 per cent. of the plants were resistant to blight. J. Wallin states that a preliminary forecast of the occurrence and development of late blight [32, pp. 29, 585] attempted during 1950 proved 100 per cent. accurate. Charts from eight hygrothermographs placed in potato or tomato fields in seven States in the north central region were analysed for the number of continuous hours at 70° F. or less and 90 per cent. or more relative humidity. Ten hours or over was considered favourable for the fungus to develop [cf. 32, p. 586].

W. J. Hooker and C. E. Peterson found that sulphur increased potato yields by 50 bush. per acre in several places and increased the total yield of marketable potatoes by almost 50 per cent. Although it controlled scab [*Actinomyces scabies*: 31, p. 139], it did not eliminate the disease completely.

W. F. Buchholtz reports that *Prunus tomentosa* is as good an indicator of stone fruit viruses as sour cherry [33, p. 68]. The establishment of virus-free plum material in Iowa together with suitable sources of virus-free wild plum stocks is under way.

Rapport annuel pour l'exercice 1951. [Annual report for the year 1951.]—*Publ. Inst. nat. agron. Congo belge, 1952* (hors sér.), 436 pp., 1 map, 1952.

The following items occur in the sections of this report dealing with phytopathological work in the Belgian Congo [cf. *R.A.M.*, 31, p. 422]. At the Yangambi centre (pp. 108–118) the main problem affecting coffee cultivation is still tracheomycosis [*Gibberella xylarioides*: 32, p. 556]. Inoculations of well-developed *Coffea robusta* seedlings, 1·5 to 2 cm. in diameter at the base of the stem, with *G. xylarioides* gave a very low percentage of positive results [cf. 31, p. 422]. *Polyporus coffeae* in association with *Pseudococcus citri* [26, p. 235] was detected once on *C. robusta*. A few three-year-old cacao trees developed die-back and canker associated with *Lasiodiplodia* [*Botryodiplodia*] *theobromae* [30, p. 181] and *Fusarium decemcellulare*, the latter being saprophytic. Important losses of the rubber clone Y284/69 were caused by a physiological disorder resembling B.B.B. [brown bast: 31, p. 423], except that the dry necrosis of the bark spread rapidly up the whole trunk and along the branches. Infection by *Oidium heveae* spread in the regenerating foliage of certain clones, causing leaf-fall and reaching epidemic proportions.

Mature maize was attacked by *Puccinia sorghi*, but no serious damage was caused. *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: 31, p. 422] is endemic on rice at Yangambi.

When seedling oil palms were grown for three months in three different types of soil, (*a*) Lilanda, very light and sandy, (*b*) 'Km 5', representative of Yangambi soils, and (*c*) river-bank heavy clay, and then soil-inoculated with the tracheomycosis *Fusarium* [*F. oxysporum*: 31, p. 282] infection was 25, 6, and 13 per cent., respectively.

From the regional laboratory of Gandajika (pp. 126–129) it is reported that ear rot of maize, caused by *Diplodia zeae* and *F. moniliforme* [*G. fujikuroi*] var. *subglutinans* [cf. 31, p. 487], was less prevalent in crops sown in January, which were harvested during the very dry season, than in those sown in September. Seed of Gar 33/22 cotton from a field severely attacked by *F. vasinfectum* [32, p. 624], of which this variety is tolerant, had 4·5 to 5 per cent. infection after delinting in concentrated sulphuric acid. The seeds that floated were the most heavily infected. Further treatment by soaking for six hours in a 0·4 aqueous solution of mercuric chloride eliminated 95 per cent. of the infection. A strain of *Trichoderma viride* isolated from lint displayed antagonism to *F. vasinfectum* [31, p. 422] in culture.

In cotton breeding work at Bambesa experimental station (pp. 309–316) no increase in resistance to *F. vasinfectum* was noted in the progeny of 13 unaffected plants collected from a plot of severely affected Stoneville 5/90.

Kerr (A.). **A method of isolating soft-rotting bacteria from soils.**—*Nature, Lond.*, 172, 4390, p. 1155, 1953.

Work carried out at the North of Scotland College of Agriculture demonstrated the facility of isolating potato soft rot bacteria (*Bacterium carotovorum*) [*Erwinia carotovora*] when infection had taken place through the lenticels.

As a result a rapid and reliable method was devised at the Waite Research Institute, University of Adelaide, South Australia, for isolating soft rot bacteria

from soils. Immature potato tubers, freshly dug and free from surface wounds, were surface-sterilized and placed in a soil suspension (5 gm. in 50 ml.) for five minutes, after which each tuber was incubated in a small glass jar at 100 per cent. relative humidity and 26° C. A small piece of rotted tissue from the extremity of the rot yielded a bacterial suspension which was streaked on to nutrient agar. Twenty soil samples obtained from the Macaulay Institute for Soil Research, [Scotland], were tested by this method; in every case all the inoculated tubers developed soft rot as a result of lenticel infection and yielded pathogenic bacteria.

Webb (M.). **Effects of magnesium on cellular division in bacteria.**—*Science*, 118, 3073, pp. 607–611, 3 graphs, 1953.

After recapitulating the results of studies by himself and other workers (42 references) on the effects of magnesium on cellular division in bacteria, the author puts forward the view that there is very little doubt that an inadequate supply of ionic magnesium in the culture medium adversely affects various aspects of the nitrogen metabolism of Gram-positive bacteria. Not only is there a diminution in the changes induced in their relative contents of protein nitrogen and acid-soluble nitrogen in magnesium-deficient media when growth occurs in the form of filaments, but the effect of magnesium deficiency on the chemical composition of Gram-positive bacteria differs essentially from that on Gram-negative. The latter, while inhibited by excessive amounts of magnesium, are unaffected by deficiency.

Braun (A. C.). **Bacterial and host factors concerned in determining tumor morphology in crown gall.**—*Bot. Gaz.*, 114, 4, pp. 363–371, 6 figs., 1953.

Studies at the Laboratories of the Rockefeller Institute for Medical Research, New York, on crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) [*R.A.M.*, 33, p. 19] in Turkish tobacco and Mammoth Russian sunflower, using the moderately virulent T 37 or the highly virulent B 6 strain, have shown that essentially three factors determine the morphological structure of the overgrowth, namely, the strain of the bacterium used, the relative position of the tumour in the host, and the inherent potentialities of the host cells.

Malaguti (G.). **Ceratostomella fimbriata en el Cacao de Venezuela.** [*Ceratostomella fimbriata* on Cacao in Venezuela.]—*Acta cient. venezol.*, 3, 3, pp. 94–97, 4 figs., 1952. [English summary.]

Ceratostomella [*Ceratocystis*] *fimbriata* is reported to cause severe necrosis of the trunk and main branches of cacao trees in Venezuela [cf. *R.A.M.*, 32, p. 132], destroying large areas of wood and bark to the depth of the medulla. This is the first record of the fungus on cacao in Venezuela. As with its other hosts, the pathogen is a wound parasite. Newly invaded bark frequently secretes a reddish gum but when dead it is dry, depressed, discoloured, and invaded by insects. Short-necked or neckless perithecia occur in the medulla and occasionally in wounds and crevices. The disease is less frequently observed and less severe on the pods. The strain isolated from cacao is morphologically indistinguishable from those from coffee, sweet potato, and *Crotalaria* [loc. cit.] and is pathogenic to these hosts. Pathogenicity to cacao was established by inserting a small piece of agar into wounded seedlings or sprinkling wounded plants with an aqueous spore suspension.

The disease is more severe near the coast than at higher altitudes, and was particularly prevalent at Choroní and Aroa, where more than 3 per cent. of the trees were destroyed in six months.

Infection foci may be reduced by burning diseased trees, while the application of copper- or zinc-based fungicides every 15 to 30 days, according to rainfall, would protect against the entry of the fungus where only a few trees are involved.

Fuchs (W. H.). **Fortschritte der Resistenzzüchtung bei Getreide im letzten Jahrzehnt.** [Progress in breeding for resistance in cereals during the last decade.]—*Z. Pflanzenz.*, 31, 1, pp. 1–41, 4 diags., 1951. [Received January, 1954.]

This is the second part of a critical survey of the bibliography (280 titles) on the breeding of cereals for resistance to disease [cf. *R.A.M.*, 29, p. 205] in different parts of the world; it deals with the rusts (*Puccinia* spp.).

Ponchet (J.). **Rapport de la mission d'études sur les maladies des céréales aux États-Unis effectuée en 1951.** [Report of the mission for studies of cereal diseases in the United States carried out in 1951.]—*Ann. Inst. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 4, 1, pp. 91–119, 11 figs., 1953.

The author gives a detailed account of observations made during a visit to research stations in Kansas, Nebraska, South Dakota, Minnesota, Wisconsin, Michigan, and New York in 1951, on the work being done on cereal diseases there. A section is devoted to American methods of informing farmers of the results of recent research work, and the paper concludes with a brief discussion of the applicability of American practices to French conditions.

Hiratsuka (N.) & Miyashita (S.). **Studies on the rust-resistance of cereals. II. Susceptibility of various species of Triticum and its related genera to the black rust of Wheat, Puccinia graminis f.sp. tritici.**—*Jap. J. Breed.*, 2, 1, pp. 1–192, 1953. [Japanese, with English summary.]

Race 11 of *Puccinia graminis tritici* was inoculated into seedlings of different varieties or strains of cereals and grasses in Japan. Within the einkorn wheat group, three strains of *Triticum monococcum* were susceptible and one was resistant. Eight species of the emmer group were susceptible. Strains of *T. timopheevi* were highly or moderately resistant, while five species of dinkel [*T. spelta*] were susceptible except for a few strains. Thirty-one varieties or strains of 16 species of *Aegilops* were susceptible and 13 of three species moderately or highly resistant. Nineteen varieties or strains of five species of *Hordeum* were resistant. Oats and *Haynaldia villosa* were highly resistant, while four amphidiploid plants derived from four different crosses, including *T. dicoccoides* var. *spontaneo-nigrum* × *A. squarrosa*—2, were susceptible.

Mehta (K. C.). **Control of rust epidemics of Wheat in India—a national emergency.**—Eleventh A. J. C. Bose Memorial Lecture, 28 pp., 1 pl., 1949.

This is a discussion, in popular vein, of the various aspects of wheat rust in India caused by three species of *Puccinia* [*P. graminis*, *P. triticina*, and *P. glumarum*: *R.A.M.*, 33, p. 77] and methods for the control of epiphytotics. The average wheat yield is now only 8 maunds [1 maund = 82 lb.] per acre or less as against about 28 maunds per acre produced by the United Kingdom. The average annual loss of wheat and barley through rust (*P. graminis* and *P. glumarum* on barley) amounts to 6 or 7 lac tons [1 lac = 100,000], but these figures may be doubled or trebled whenever a serious epiphytotic affects large areas. Control measures [loc. cit.] are discussed.

Tyler (L. J.) & Jensen (N. F.). **Protective cover—a factor influencing the development of dwarf bunt in winter Wheat.**—*Plant Dis. Reptr*, 37, 9, pp. 465–466, 1953. [Multilithed.]

The results of preliminary trials conducted in 1952 at Ithaca, New York, indicated that a straw cover during the winter was favourable to the development of dwarf bunt (*Tilletia brevifaciens*) of winter wheat [*R.A.M.*, 32, p. 425] and that inoculum applied to the soil was consistently more effective under the prevailing

conditions of light snowfall and repeated thawing than that applied directly to the seed. It has been observed that incidence is often higher on the leeward side of fences, hedges, hilltops, and, according to farmers, snow fences. The frequently localized distribution of dwarf bunt in the field may be due to the unequal deposition or persistence of snow.

Briggs (F. N.). **Registration of improved Wheat varieties XX.**—*Agron. J.*, 45, 7, p. 317, 1953.

Important characters of the new wheat variety Sioux (Reg. No. 347), recently approved [cf. *R.A.M.*, 31, p. 546] for cultivation in central, south-central, south-western, and western Nebraska, are its winter-hardiness and resistance to bunt [*Tilletia* spp.]. Selected in 1939 from a cross between Cheyenne and Turkey made in 1933, Sioux has consistently equalled the former and exceeded the latter parent in productivity.

Holton (C. S.). **Fusion between secondary sporidia in culture as an index of sex compatibility in Tilletia species.**—*Phytopathology*, 43, 6, pp. 322–323, 1953.

At Washington Agricultural Experiment Station secondary sporidia of wheat bunt (*Tilletia caries*) fused in culture when placed in pairs [*R.A.M.*, 32, p. 566] with the aid of a micromanipulator [30, p. 517]. The process was accomplished more readily between sporidia in direct contact than at distances of 10 or 50 μ apart, the percentages of fused pairs in the three groups being 100, 70, and 30, respectively. Furthermore, a nutrient medium exerted a stimulatory action on fusion, which was increased from 10 per cent. on water agar to 92·7 on Zscheile's T–1 agar [31, p. 322] and 79·4 per cent. on potato dextrose agar.

As indicated by fusion between secondary sporidia, compatibility relationships were on a simple bifactorial basis, whether the partners originated in the same or different spores. However, the monosporidial lines of opposite sex, as indicated by fusion of secondary sporidia, were not completely opposite in their relationships with the primary sporidia as indicated by fusion between primary and secondary sporidia. These results do not conform to the compatibility patterns previously established by primary sporidial fusions [14, p. 432] and pathogenicity tests [11, p. 440; 15, p. 637; 30, p. 517] and require clarification by inoculation experiments.

Janke (A.), Beran (F.), & Schmidt (Gertrude). **Über die Einwirkung von Schwermetallsalzen auf Pilze. II. Über die Einwirkung von Schwermetallsalzen auf Brandpilze.** [On the effect of heavy metal salts on fungi. II. On the effect of heavy metal salts on smut fungi.]—*PflSchBer.*, 10, 5–6, pp. 65–87, 1953. [English summary.]

Further studies at the Federal Plant Protection Institute, Vienna, on the toxic mechanism of the heavy metal salts used as fungicides [*R.A.M.*, 32, p. 136] demonstrated that the fungistatic action of mercuric chloride, phenyl mercury acetate, and copper sulphate on wheat bunt (*Tilletia tritici*) [*T. caries*] spores can be partially or wholly eliminated by mixing with the solution cysteine, thioglycollic acid, or 2,3-dimercaptopropanol (British anti-lewisite), cysteine being the most powerful. The fungistatic effect of copper sulphate was more resistant to elimination by thiol compounds than that of the mercurials, and the effect of phenyl mercuric acetate than that of mercuric chloride. The fungistatic effect of mercuric chloride becomes irreversible within five minutes, whereas that of phenyl mercuric acetate remains partially reversible for an hour and slightly so for up to 24 hours.

Confirmation of the hypothesis that the heavy metals react with thiol groups in the spores of *T. caries* was provided by the Folin test (*J. biol. Chem.*, 83, pp. 109–113, 1929), which showed that one-year-old samples contained 0·1 per cent. multivalent thiol.

Last (F. T.). **Some effects of temperature and nitrogen supply on Wheat powdery mildew.**—*Ann. appl. Biol.*, 40, 2, pp. 312–322, 6 graphs, 1953.

In glasshouse studies at Rothamsted Experimental Station Red Standard wheat was more susceptible to infection by *Erysiphe graminis* [*R.A.M.*, 33, p. 76] at 14° to 20° C. than at about 7°. At 14° conidial production per unit area of pustule was more than ten times as rapid as at 7°. Increased susceptibility after application of nitrogenous fertilizer was associated with changes in growth rate; both growth rate and susceptibility increased to a maximum and then dropped, the curves for the two running parallel with a lag of some days between effect on growth rate and effect on susceptibility [cf. 33, p. 78]. Plants past the susceptible phase became susceptible again when supplied with more nitrogen. Nitrogen-deficient plants were continuously resistant. The higher the average growth rate, the greater was the total amount of infection, increase in the average growth rate being quickly followed by marked increase in the amount of infection. When plants of two size-groups received equal nitrogen the initially smaller plants became more severely diseased than the larger.

Butler (F. C.). **Saprophytic behaviour of some cereal root-rot fungi. I. Saprophytic colonization of Wheat straw. II. Factors influencing saprophytic colonization of Wheat straw. III. Saprophytic survival in Wheat straw buried in soil.**—*Ann. appl. Biol.*, 40, 2, pp. 284–297, 298–304, 305–311, 1953.

In studies at the Botany School, University of Cambridge, on the ability of four cereal root-rotting fungi to colonize wheat straw as saprophytes, test pieces of straw previously soaked in a nutrient solution were buried in a graded dilution series of a maize-meal-sand culture of the test fungus with unsterilized soil. The percentages of straws colonized were assessed by (1) isolations on agar, (2) a wheat seedling test, and (3) incubation on moist sand. *Curvularia ramosa* [*R.A.M.*, 25, p. 104] and *Fusarium culmorum* [loc. cit. and above, p. 139] behaved as vigorous competitive saprophytes of the soil-inhabiting type; *Helminthosporium sativum* [loc. cit.] and *Ophiobolus graminis* [33, p. 76] were weak saprophytic colonizers of the specialized root-inhabiting type.

The difference in the competitive saprophytic ability of *C. ramosa* and *H. sativum* did not appear to be due to a difference in growth rate or to the ability of *C. ramosa* to produce an antibiotic. *H. sativum* was, however, more sensitive than *C. ramosa* to antibiotics formed by other soil micro-organisms; in *in vitro* spore germination tests with purified fungal antibiotics *H. sativum* was more sensitive to eight of ten substances tested than *C. ramosa*, and only slightly less so to the remainder. It was generally more sensitive than *C. ramosa* to the antagonistic effects of certain common soil bacteria. Of the seven bacterial species tested, five appreciably reduced germ-tube development and two reduced germination in *H. sativum*, though none inhibited spore germination or germ-tube development in *C. ramosa*; three stimulated germ-tube growth.

Ample nitrogen supply prolonged the survival of *O. graminis* and *C. ramosa* in infected wheat straw in unsterilized soil, but shortened that of *H. sativum*. Two isolates of the latter from different sources were able to utilize nitrate and other sources of nitrogen. The depressing effect is, therefore, attributed to the encouragement of competing micro-organisms in the straw by the nitrogen sources.

Johnson (I. J.). **Registration of Barley varieties.**—*Agron. J.*, 45, 7, pp. 320–322, 1953.

Three of six barley varieties approved for registration in 1952 [cf. *R.A.M.*, 21, p. 329] exhibited resistance to disease. A note on Kenbar (Reg. No. 20) has already appeared [32, p. 16].

Harbine (Reg. No. 21), developed at Oklahoma Agricultural Experiment Station between 1930 and 1935 from Composite Cross III, has shown considerable resistance to *Puccinia triticina* and several other leaf pathogens as well as to various races of *Ustilago nuda*.

Mo. B-400 (Reg. No. 22), selected in 1942 at Missouri Agricultural Experiment Station from a cross between Kentucky 5 and Missouri Early Beardless [29, p. 359] made in 1936, has proved highly resistant to *U. nuda* and moderately so to *Erysiphe graminis* and spot blotch [*Helminthosporium sativum*], but it is susceptible to *U. nigra* and *U. hordei*.

Suneson (C. A.). **Frost-induced natural crossing in Barley, and a corollary on stem rust persistence.**—*Agron. J.*, 45, 8, pp. 388–389, 1953.

At the Department of Agronomy, University of California, Davis, stem rust [*Puccinia graminis*] was subject to a succession of frosts in December and January, 1949 to 1950. The destruction of tissue in Palestine oats induced profuse teleutospore production [*R.A.M.*, 30, p. 224]. The uredospores were killed and the new basal growth was consequently free from infection. On the other hand, the very hardy Kanota variety sustained little damage and the uredo stage therefore persisted, successive spread of *P. graminis* being recorded on 25th February, 15th March, and 18th April. The new growth of Palestine which headed on 20th March remained healthy until maturity, though separated from Kanota by only a single row of resistant Ventura oats. In this experiment pollen from California Mariout barley was effective over a longer distance (6 ft. or more) than stem rust spores.

Wilten (W.). **Het bestrijden van dwergroest (Puccinia simplex) in Zomergerst.** [The control of dwarf rust (*Puccinia simplex*) in summer Barley.] –*Jaarbje nat. Com. Brouwg.*, 17, pp. 72–79, 1953.

A tabulated survey is given of experiments on the control of barley rust (*Puccinia simplex* [*P. hordei*]) in summer crops in North Holland [*R.A.M.*, 17, p. 231] during 1952. The importance of winter barley as a source of infection was clearly demonstrated, the critical distances for spore transmission ranging from 450 to 600 m. according to the position of the plots in relation to the prevailing wind. Spraying heavily and lightly rusted stands with 0·25 per cent. zineb or aaphytora (with zineb as the active principle) at the time of earing (5th June) resulted in increased yields of 12 and 6 per cent., respectively. The cost of one application at 800 to 1,000 l. per ha. is about Fl. 35, while the value of a 6 per cent. yield increase may be estimated at Fl. 54. The profits would be proportionately higher with more severe infection, while three to five treatments might also raise production. For instance, gains of 30 and 10 per cent. were obtained by three treatments on heavily and lightly rusted plots, respectively.

Yellow rust (*P. glumarum*) was much less prevalent than *P. hordei*, epiphytotics having been observed in only three breeding establishments, though it appeared during the first 10 days of June, about a month earlier than *P. hordei*. A high degree of field resistance to *P. glumarum* was shown by Agio and Piroline (Heine 505), while Balder, Kenya, and Herta were very severely attacked.

Tessi (J. L.). **'Xanthomonas translucens f. s. hordei' en la Argentina y determinación de variedades de Cebada resistentes.** [*Xanthomonas translucens* f.sp. *hordei* in Argentina and the determination of resistant Barley varieties.]—*Rev. Invest. agríc., B. Aires*, 5, 3, pp. 353–378, 2 pl., 1951. [Received July, 1953.]

It is now known that *Xanthomonas translucens* f.sp. *hordei* has been present on barley in Argentina [cf. *R.A.M.*, 30, p. 515] for some years. It occurs practically

throughout the cereal-growing region but is particularly prevalent in the west and south-west of the province of Buenos Aires. Rye also is affected (*X. t.* f.sp. *secalis*).

Included in a list of resistant varieties are Maja and Black Russian C.I. 2202; resistant, but to a lesser degree are Cartens 1 and Clemson Hooded C.I. 7042. In inoculation tests the resistant varieties reacted more or less similarly to all the strains used from various parts of the country, indicating that the pathogenicity of the Argentine isolates is homogeneous.

[This paper also appears as *Publ. técn. Inst. Fitotecn., B. Aires*, 54, 1951.]

Kitani (K.), Inoue (Y.), & Shigematsu (Y.). **On the white stripe of Barley, a new physiological disease.**—*Agric. & Hort.*, 28, 11, pp. 1325–1327, 1953. [Japanese.]

At an early stage of tillering circular, white or striped lesions appear first on the lower leaves of barley in Japan and then extend to the upper ones. Later in the spring many white patches merge into large, white lesions encircled by brown or blackish-brown bands. On extensively affected leaves the interveinal parts become chlorotic, the veins appearing as chains of minute, green dots; this symptom usually disappears after heading. Wheat raised on affected soil displays interveinal chlorosis more distinctly than barley, but the striped lesions are absent. The magnesium content of chlorotic leaves is abnormally low, and the disorder can be partly or wholly prevented by the use of a magnesium soil amendment, avoiding an excess of nitrogen and potassium.

Müller (E.). **Versuche mit dem Rhynchosporium-Schorf von Gerste und Roggen.** [Experiments with the *Rhynchosporium* scab of Barley and Rye.]—*Annu. agric. Suisse*, (54) N.S. 2, 5, pp. 739–743, 3 figs., 1953. [French summary.]

'Scab' or 'scald' [leaf blotch] is prevalent throughout Switzerland on winter rye and winter barley, reducing seed production through premature defoliation. In inoculation experiments on wheat, barley, oats, and rye with two isolates of the causal organism, *Rhynchosporium secalis*, one from barley and the other from rye, both in the canton of Zürich, each attacked only its own host, thereby confirming the results obtained by Caldwell in the United States [*R.A.M.*, 17, p. 22].

Finkner (N. C.). **Inheritance of susceptibility to Helminthosporium victoriae in crosses involving Victoria and other crown rust resistant Oat varieties.**—*Agron. J.*, 45, 9, pp. 404–406, 1953.

At Iowa Agricultural Experiment Station non-allelic factors for resistance to crown rust [*Puccinia coronata*: see above, p. 142], whether epistatic or hypostatic to the Victoria type of resistance, exerted no effect on the dominance of susceptibility to *Helminthosporium victoriae* in crosses between Victoria as one parent and Ukraine, Clinton, Klein 69B, Landhafer [*R.A.M.*, 32, p. 426], and Anthony-Bond × Boone as the others [30, p. 103]. An allele to the Victoria factor found in Anthony-Bond × Boone was recessive to the Victoria factor in reaction to both *P. coronata* and *H. victoriae*. No indication of linkage was detected between the Victoria type of crown rust resistance and susceptibility to *H. victoriae*.

Poole (D. D.) & Murphy (H. C.). **Field reaction of Oat varieties to Septoria black stem.**—*Agron. J.*, 45, 8, pp. 369–370, 3 figs., 1953.

At Iowa Agricultural Experiment Station and other places in the State, the reactions of 18 varieties of oats to the leaf blotch and black stem phases of *Leptosphaeria avenaria* [*R.A.M.*, 32, p. 426] were determined in the summer of 1951. Clinton, Branch, Mo.0-200, Shelby, Mo.0-205, Colo, and Richland were fairly resistant to leaf blotch, while Marion, Andrew, Cherokee, Mindo, Benton, Nemaha, and Bonham were highly susceptible. The most resistant to black stem were

Branch, Shelby, Ajax, Beaver, Clinton, Mo.0–205, Mo.0–200, and Richland, while the maximum degree of susceptibility was exhibited by Andrew, Marion, Benton, Zephyr, Cherokee, Bonham, Colo, Mindo, Nemaha, and Bonda. There was a significant positive correlation (highly significant at three out of seven locations) between the varietal reactions to leaf blotch and black stem. The black stem phase was negatively correlated with yield at eight testing centres but significant only at one. The development and enhanced severity of the disease during the past five years did not appear to be associated with the recent extension in the cultivation of Clinton, Shelby, and other Bond derivatives.

Meyer-Bahlburg (W.). **25 Jahre Kupferdüngung.** [Twenty-five years of copper fertilizing.]—*Dtsch. landw. Pr.*, 76, 5, pp. 50–51, 1953.

The author briefly summarizes the results of 25 years' observations on the control of copper deficiency, especially in oats following potatoes, in northern Hanover, Germany [*R.A.M.*, 7, p. 269], by soil amendments with copper sulphate and other copper-containing fertilizers. In severe cases heavy applications (up to 1·6 doppelzentner [1 doppelzentner = 100 kg.] per ha.) are requisite to ensure full yields, but after several a ten-year interval may elapse before further treatment becomes necessary.

Une nouvelle rouille du Maïs. [A new rust of Maize.]—*Bull. Inform. Inst. nat. agron. Congo belge*, 11, 2, pp. 137–138, 1953.

In 1949 maize rust (*Puccinia polysora*) [*R.A.M.*, 33, pp. 16, 23] appeared in Oubangui-Chari, French Equatorial Africa, and at Berberati, 500 km. from Libenge, Belgian Congo. It was also reported in Senegal.

Coleman (O. H.) & LeBeau (F. J.). **A comparison of three methods of rating red rot infection in Sorghum.**—*Agron. J.*, 45, 8, pp. 377–378, 2 figs., 1 graph, 1953.

Three techniques for rating red rot (*Colletotrichum graminicola*) infection were compared on 258 plots in four sorghum breeding nurseries near Meridian, Missouri [*R.A.M.*, 30, p. 463 and next abstract]. Total stalk rating by internodes was the most satisfactory of the methods tested, but it requires considerable time both in the field and in the evaluation of the data. Red rot discoloration throughout the length of a stalk was usually associated with severe damage to some of the internodes. The single rating per stalk, using a scale of disease readings from 0 to 4, proved to be both expeditious and reliable.

Karper (R. E.). **Registration of Sorghum varieties, VI [? VII].**—*Agron. J.*, 45, 7, pp. 322–323, 1953.

Of the six new sorghum varieties approved during the past year [cf. *R.A.M.*, 31, p. 114], Sart (Reg. No. 96), released by Mississippi Agricultural Experiment Station in 1951 for syrup production, is resistant to *Colletotrichum graminicola* [see preceding abstract].

Combine Kafir-60 (Reg. No. 97), developed at Texas Agricultural Experiment Station between 1944 and 1950 by crossing a double dwarf kafir selection with Texas Blackhul kafir and back-crossing with Texas Blackhul, is resistant to charcoal rot [*Macrophomina phaseoli*: 30, p. 153].

Fedorinchick (N. S.). Бороться с инфекционным усыханием (мальсекко) Цитрусовых. [Control of infectious desiccation (mal secco) of Citrus.]—Сад и Огород [*Orchard & Garden*], *1953*, 8, pp. 21–23, 1953.

So far one of the main methods of controlling citrus mal secco [*Deuterophoma tracheiphila*: *R.A.M.*, 32, p. 622] in the U.S.S.R. has been by pruning the diseased

parts of the crown of the tree. This, however, does not give satisfactory results unless it is done before the fungus sporulates and starts initial infections. At the Pan-Soviet Institute for Plant Protection, U.S.S.R., in 1952 a method of diagnosis used on trees in the Batumsky region has enabled the disease to be almost eliminated; it consisted in applying one or two drops of a 20 per cent. sodium hydroxide solution to a cross section (slanting cuts) of the twig, which enhanced the carrot colour of the diseased tissue, while healthy parts turned yellow. Symptoms of primary infection on various *Citrus* species are described.

Hughes (W. A.) & Lister (C. A.). **Lime dieback in the Gold Coast, a virus disease of the Lime, Citrus aurantifolia (Christmann) Swingle.**—*J. hort. Sci.*, 28, 2, pp. 131–140, 1 pl., 1953.

Lime trees within 25 miles north of Cape Coast, Gold Coast, are affected by a die-back [*R.A.M.*, 26, p. 286; 29, p. 97; 31, p. 62] which first caused serious trouble in 1938. It is now all but impossible to grow limes from seed in the open. Vein-clearing may be patchy or form a network covering the leaf. Most apparent in the young leaf, the symptoms may vanish as the leaf hardens. A corky enation of the veins, termed 'corky vein', on the upper surface is frequently present on experimental plants, though rare in the field.

Under the bark of the branches brown pits and longitudinal streaks on the surface of the xylem are sometimes observed [cf. 30, p. 566]. The pits are caused by gumming in the xylem and, to a less extent, in the phloem. It appears to start in the cambium, large, thin-walled cells filling with gum and degenerating, leaving a pocket of gum in which isolated cells float. Intercellular gumming may occur, and scattered xylem vessels may be blocked by plugs of gum.

A sector of the bark often dies with a strip of dead tissue running from a dead root along one side of a main branch to a dead twig at its distal end. This symptom is termed 'sectorial die-back'. The root hairs die and are not replaced, and this is followed by the gradual death of the roots and of the whole tree.

When grafted with twigs from a tree with veinal symptoms and crown die-back 58 seedlings all developed vein flecking, six die-back, and none dwarfing. When twigs with veinal symptoms and dwarfing were used 50 seedlings all developed vein flecking and dwarfing and none die-back. The results indicated that there are two strains of the virus.

Bark from rough lemon, sour orange, lake tangelo, and Sampson tangelo stocks of die-back trees, and shoots of three varieties of sweet orange, a tangerine, and a grapefruit (all showing symptoms resembling quick decline or tristeza [31, p. 62; 33, p. 80]) grafted to healthy lime seedlings showed that all were naturally infected with die-back. Rough lemon, lemon, Trinidad wild grapefruit, Syrian sour orange, and *Clausena anisata* were symptomless carriers, while sour orange, citron, *Aeglopsis chevalieri*, and *Afraegle paniculata* developed symptoms on grafting. Ten seedling *Citropsis articulata* grafted with twigs from diseased limes all died.

Aphis citricidus transmitted the virus after one hour's feeding on infected lime, and efficiency of transmission appeared to increase with length of feeding time, up to 24 hours. *Ferrisia virgata*, though rarely found on citrus in the Gold Coast, transmitted the virus after 30 hours' feed.

It is assumed from the available evidence that the disease is caused by a virus or virus complex similar to that responsible for tristeza and stem-pitting of grapefruit.

Affected lime trees budded on rough lemon 10 to 15 years ago are growing vigorously though they have leaf symptoms and stem-pitting but no die-back, and the lime industry is now being rehabilitated by the replacement of moribund seedling limes with this combination. Fruit is produced within three years of planting and they are expected to yield an economic crop for at least ten years.

Wallihan (E. F.). **Iron chlorosis.—What is it?**—*Calif. Citrogr.*, 38, 11, pp. 414–416, 3 figs., 1953.

Studies at the University of California Citrus Experiment Station revealed that when leaf samples from citrus trees suffering from iron chlorosis [*R.A.M.*, 32, p. 429 and cf. next abstract] were washed thoroughly before analysis the iron content of extremely chlorotic leaves was less than 30 p.p.m., severely chlorotic leaves 25 to 40 p.p.m., and moderately chlorotic ones about 70 p.p.m. The inconsistent results previously obtained were due to the presence of iron in the dust on the leaf. The chlorophyll content was consistently proportional to the iron content [cf. 33, p. 88], even in leaves with no chlorotic pattern. It appears that iron deficiency may produce both patterned and uniformly pale leaves similar to those deficient in nitrogen.

Reuther (W.) & Smith (P. F.). **Effects of high copper content of sandy soil on growth of Citrus seedlings.**—*Soil Sci.*, 75, 3, pp. 219–224, 3 figs., 1953.

The information in this paper on acid soil chlorosis of citrus in Florida has been noticed from another source [*R.A.M.*, 33, p. 26].

Dwyer (R. E. P.). **Diseases of Coconuts (Cocos nucifera) in Papua and New Guinea.**—*Papua and New Guinea agric. Gaz.* [formerly *New Guinea agric. Gaz.*], 8, 1, pp. 24–40, 1953.

Amongst the most serious diseases of the coco-nut palm in the Territory of Papua and New Guinea are epidemic bud rot due to *Phytophthora palmivora* [*R.A.M.*, 20, p. 49] and false bud rot caused by lightning injury, which is also often associated with stem bleeding (*Ceratostomella* [*Ceratocystis*] *paradoxa*) [loc. cit.]. Physiological disorders due to mineral deficiencies in the soil are also common. These are included in a list of coco-nut diseases recorded to date in this area, and arranged under the headings bud rot, root rots, stem, leaf and nut diseases, physiological disorders, and suspected virus diseases.

The history and incidence of bud rot in the Territory and neighbouring countries are recapitulated in detail. *P. palmivora* is widespread throughout Papua and New Guinea, and develops in seasons of abnormally heavy rainfall and where the palms are growing in waterlogged soil. An outbreak of 'spear die-back' of oil palms [*Elaeis guineensis*] at Keravat Lowland Experiment Station before 1939 was associated with *P. palmivora*.

Control measures taken for outbreaks of *Phytophthora* bud rot include digging drainage trenches, removing and burning infected palms, and painting those in the early stages of infection with Bordeaux paste. This confined the disease to one estate, where about 1,200 palms were cut out. The author considers that the incidence of bud rot is closely related to soil conditions as well as rainfall. A bibliography of 88 titles on coco-nut diseases is cited.

De Leon (D.). **Kadang-kadang disease of Coconuts in the Philippines.**—*Foreign Agric.*, 16, 5, p. 103, 1952.

Further studies were carried out at the Philippine Bureau of Plant Industry on coco-nut kadang-kadang disease [*R.A.M.*, 30, p. 227]. Although the true cause of the disease still remains unknown, certain preventive measures have been recommended. These include felling diseased palms as soon as they stop producing normal-sized nuts, suspension of planting in the Bicol area, where 1,500,000 trees are dying from the disease, until effective control measures have been found, and underplanting as early as possible with other crops recommended by the Provincial Agricultural Supervisor. The yearly losses amount to $1,800,000. An enlarged research programme to solve the cause of this disease is being sponsored by the Bureau with the assistance of the United States Government.

Orsenigo (J. R.), Segall (R. H.), Smith (O.), & Wellman (F. L.). **Systemic foliage distortions in Coffee attributed to 2,4-D.**—*Turrialba*, 3, 3, pp. 100–101, 1953. [Spanish summary.]

The application of 2,4-D to destroy weeds [*R.A.M.*, 30, p. 304] in coffee plantings at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica, from 1946 to 1949, resulted several weeks later in reddening, stunting, and distortion (curling, frilling, and wrinkling) of the leaves even when followed by heavy rain. Seedlings and bushes fruited normally, however, and eventually produced completely normal new growth when the treatments were stopped.

Guillemat (J.). **Observation du 'wilt' sur les Cotonniers cultivés dans la région méditerranéenne.** [Wilt observed on Cotton plants growing in the Mediterranean region.]—*Phytoma*, (*1952*), 36, pp. 8–11, 6 figs., 1952.

In October, 1951, several fields of cotton in the departments of Aude and Hérault, southern France, were found to be suffering from wilt caused by *Fusarium vasinfectum* [*R.A.M.*, 33, p. 52] and *Verticillium albo-atrum* [cf. 32, p. 312], presumably as the result of sowing infected seed imported from the United States.

Blank (L. M.), Leyendecker (P. J.), & Nakayama (R. M.). **Observations on black root rot symptoms on Cotton seedlings at different soil temperatures.**—*Plant Dis. Reptr*, 37, 9, pp. 473–476, 2 figs., 1952. [Multilithed.]

Studies on the symptoms of cotton black root rot (*Thielaviopsis basicola*) [*R.A.M.*, 32, p. 623] at New Mexico Agricultural Experiment Station showed that the absence of nematodes from steamed, artificially infested soil or their presence in naturally infested field soil did not alter the pathogenicity of *T. basicola* to American–Egyptian cotton seedlings grown at three soil temperatures in the greenhouse. The disease was most severe at 69° F., finally killing the plants, while at 77° and 79° stunting of the aerial parts was a characteristic symptom, infection remaining localized in the crown area and causing pronounced swelling.

Thompson (G. E.). **A comparison of Ascochyta abelmoschi Harter and A. gossypii Sydow in culture and inoculation experiments.**—Abs. in *Phytopathology*, 43, 5, pp. 293–294, 1953.

First-generation cultures of *Ascochyta abelmoschi* [*R.A.M.*, 33, p. 72] and *A. gossypii* [30, p. 229; 33, p. 81] obtained from single conidia [? at Georgia Experiment Station] usually produced a greyish-black aerial mycelium in culture on potato dextrose agar at 25° C. Some colonies of each species were similar, while others were different. Pycnidia with conidia were sparse, scattered, or in sectors after three to four weeks. Variants differing among themselves in colour, amount of aerial mycelium, growth rate, pycnidial production and dimensions, colour of pycnidial walls, and conidial size and septation developed in subcultures from single conidia. The optimum temperature for the growth of certain strains of both species was about 25°, though for one variant of *A. gossypii* it was 20°. No clear-cut morphological differences were observed between pycnidia and conidia from the type specimens of *A. abelmoschi* on okra [*Hibiscus esculentus*] and those of *A. gossypii* on cotton. The inoculation of Mammoth Long Pod okra and Coker 100 Wilt cotton with conidia from a strain of *A. gossypii* caused foliar infection on both hosts, accompanied in cotton by a die-back of the terminal growing points. Blue lupin was susceptible to strains of both species.

Menzel (K. C.). **Zur Frage des Rostbefalles von Flachs.** [On the question of rust infection of Flax.]—*Faserforsch. u. Textiltech.*, 3, 3, pp. 105–109, 8 figs., 1952.

Observations at a German fibre research station on the mode of infection of flax

by *Melampsora lini* [*R.A.M.*, 32, p. 187] showed that the hyphae or germ tubes from uredospores penetrate the stem through the stomata and grow round the vascular bundles by way of the middle lamella. Marsh-grown flax is particularly susceptible to rust damage, even the mildest infection impairing the strength and quality of the long-staple fibres and tow. Teleutospore formation causes an agglutination of the bundles which virtually precludes the separation of the fibres in processing.

Recommendations for the prevention and control of flax rust include the avoidance of nitrogenous soils, especially marsh and moorland; experimental soil amendments with potassium and phosphorus with a view to reduction of the damage by strengthening the fibre bundles; not too sparse sowing; thorough raking and burning of the straw after harvesting to remove any remaining teleutospores; and strict observance of a seven-year crop rotation.

CULBERTSON (J. O.). **Registration of Flax varieties VI.**—*Agron. J.*, 45, 7, pp. 317–318, 1953.

The newly approved flax variety Marine (Reg. No. 12) [cf. *R.A.M.*, 31, p. 552; 32, p. 665], selected in 1944 at the North Dakota Agricultural Experiment Station from a cross between C.I. 975 and Sheyenne made in 1942, has shown adequate resistance to wilt (*Fusarium oxysporum* f. *lini*) [*F. lini*: see next abstract] and an average degree of tolerance of pasmo (*Mycosphaerella linorum*) [32, p. 665]; it carries the Ottawa 770 B gene for rust (*Melampsora lini*) resistance [loc. cit.]. It is well suited for cultivation in any region of the north-central area where disease or drought are likely to be limiting factors.

KNOWLES (P. F.) & HOUSTON (B. R.). **Resistance of Flax varieties to Fusarium wilt.**—*Agron. J.*, 45, 9, pp. 408–414, 1953.

Of 222 varieties and lines of flax tested in the greenhouse and field at the University of California, Davis, for reaction to *Fusarium oxysporum* f. *lini* [*F. lini*: *R.A.M.*, 28, p. 333 and preceding abstract], 19 were highly resistant throughout the trials, comprising 15 from the United States, namely, Redwing, Fargo No. 1846, Leona, Renew, Mandan selection C.I. 891, Bozeman selections C.I. 952–1 and 952–2, Dakota 52, Minnesota II–43–5, II–43–13, II–43–21, II–45–1, II–45–2, II–45–4, and II–45–5; three from Argentina, Lineta and two introductions, C.I. 1238 and 1298; and one from Portugal, L. Galego C.I. 1018.

Single-plant progenies of a number of commercial varieties, including Dakota, showed a considerable degree of heterogeneity for wilt resistance, the least variation occurring in Redwing, Bison, Victory, and Royal.

The use of pathogenic 'clones' (monoconidial isolates kept pure by continued selection) of the fungus in the greenhouse was found to present many advantages over tests in naturally infested soil in the determination of resistance to wilt.

CRUICKSHANK (I. A. M.) & JACKS (H.). **Seed disinfection. VII. Effect of seed treatments on emergence of Linseed and Linen Flax.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 1, pp. 33–38, 1953.

In further studies on seed disinfection at the Plant Diseases Division, Auckland, New Zealand [cf. *R.A.M.*, 33, p. 63], eleven fungicides were tested for their value as seed treatments for reducing pre-emergence losses of linseed and linen flax. Differences in the effects of treatments were similar for all varieties tested, including Golden Viking, Sheyenne, and Koto linseed and Liral Crown, Stakhanovitz, and 803/3 linen flax. Organo-mercury compounds depressed emergence in glasshouse tests and, in the case of liquid panogen (0·3 and 0·6 per cent.), in the field also, where it caused 10·4 per cent. reduction. One per cent. thirodust (75 per cent. thiram) and 0·5 per cent. phygon were the most effective in the field, giving,

respectively, 8·4 and 6·4 emergence increase, followed by 1 per cent. cuprox (4·4). The results indicate that materials based on thiram and dichloro-naphthoquinone are preferable to organo-mercury compounds for flax.

Moore (W. C.) & Tomlinson (J. A.). **Corm rot of Gloxinia.**—*Plant Path.*, 2, 2, p. 71, 1 fig. (between pp. 54 and 55), 1953.

Gloxinia corms in storage, including some from Belgium, frequently develop an unexplained rotting. It was particularly prevalent in 1951. Affected corms are soft, the internal tissues of some are wet and pink, yellow, or chocolate, or turn one of these colours a few minutes after the corms have been cut. Others may have one or more dark brown lesions extending inwards from the surface. Sometimes both symptoms are present. Isolations from the discoloured tissues gave negative results, but those from the dark brown lesions invariably yielded *Cylindrocarpon radicicola* and, occasionally, *Pythium debaryanum*. Inoculations with these fungi were negative except on one occasion, when a brown lesion developed in one of six corms inoculated with *P. debaryanum*.

Mendiola-Ela (Victoria). **The Curvularia disease of Gladiolus in the Philippines.** —*Philipp. Agric.*, 35, 10, pp. 517–538, 2 pl., 3 graphs, 1952. [Received 1953.]

Curvularia leaf spot of gladiolus, first noticed in the Philippines in 1950, is considered by the author to be caused by *C. lunata* [*R.A.M.*, 32, p. 433]. The disease and the causal fungus are fully described. It is most prevalent during the warm part of the wet season, from September to December, and is controlled in the field by zineb sprays, and in new crops by the use of uninfected corms or those treated with 1 in 1,000 mercuric chloride for two hours, dusted with fermate, and planted in the dry season, by crop rotation, and sanitary measures.

Bremer (H.). **Alternaria dianthicola Neergaard an Nelken.** [*Alternaria dianthicola* Neergaard on Carnations.]—*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 5, 5, pp. 75–76, 1 fig., 1953.

A species of *Alternaria* isolated from severely blemished carnations at Neuss, Germany, was identified by Dr. P. Neergaard as *A. dianthicola* [*R.A.M.*, 32, p. 561], not hitherto reported in the country. The symptoms were entirely restricted to the flowers.

Garga (R. P.). **Preliminary observations on a virus disease of Thevetia neriifolia Juss.**—*Curr. Sci.*, 22, 8, pp. 243–244, 1 fig., 1953.

Severe stunting and curling of the leaves, inward or outward curling of the margins, and chlorotic streaks were observed on *Thevetia neriifolia* hedge plants in the Minto Road area of New Delhi, India, in July, 1948. In experiments conducted in an insect-proof house at the Indian Agricultural Research Institute, New Delhi, the disease was successfully transmitted by wedge grafting to *T. neriifolia*, *Datura stramonium*, and Sutton's Early Market tomato. White Burley and Harrison's Special tobacco respond with mild mottle and curling.

Hanson (C. H.). **Inheritance of flower colour, resistance to powdery mildew, and other characters in Korean Lespedeza.**—*Agron. J.*, 45, 11, pp. 555–558, 4 graphs, 1953.

At North Carolina Agricultural Experiment Station, flower colour, reaction to powdery mildew (*Microsphaera diffusa*), growth habit, and erectness of main stem in *Lespedeza stipulacea* [*R.A.M.*, 19, p. 657; 30, p. 522] were each shown to be conditioned by two or more gene pairs, with indications of low probabilities for independence of flower colour and powdery mildew reaction.

Hanson (E. W.). **Relative prevalence and severity of the diseases of forage legumes in Wisconsin, 1946–1952.**—*Plant Dis. Reptr*, 37, 9, pp. 467–472, 1953. [Multilithed.]

This is an account of the prevalence and severity of diseases of red clover [cf. *R.A.M.*, 32, p. 383], ladino clover, lucerne, and sweet clover [*Melilotus* spp.] in Wisconsin during the years 1946 to 1952, inclusive, based on State-wide surveys made annually in June and August and occasional field inspections.

Hewitt (E. J.) & Miles (Peggy). **The effects of seed reserves on the production of deficiencies of copper, zinc and molybdenum in some large-seeded leguminous crops.**—*Rep. agric. hort. Res. Sta. Bristol, 1952*, pp. 199–203, 1 pl., 1952.

The results obtained in studies on the effect of seed reserves on the incidence of copper, zinc, and molybdenum deficiencies in sand cultures at Long Ashton Research Station confirm previous findings [*R.A.M.*, 23, p. 174; 29, p. 396; 32, p. 29]. It is concluded that both seed origin and weight (as affecting mineral content) may be responsible for initial difficulties in the production of molybdenum deficiency in sand cultures of large-seeded legumes (cf. *Plant Physiol.*, 27, p. 223, 1952).

Heim (Jean M.) & Gries (G. A.). **The culture of Erysiphe cichoracearum on Sunflower tumor tissue.**—*Phytopathology*, 43, 6, pp. 343–344, 1953.

At the Department of Botany and Plant Pathology, Purdue University, Lafayette, Indiana, both crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) and callus tissue of sunflower were maintained *in vitro* and surface inoculated with conidia of *Erysiphe cichoracearum* grown on aseptically reared sunflower plants. The inoculated material was incubated in an artificially illuminated room in which the sterile, mildewed plants used for the experiments were grown. Four weeks after inoculation white aerial hyphae (conidial chains) were recognizable on one piece of tumour tissue and increased steadily in numbers. With a rise in the temperature of the culture room from between 22° and 25° to 27° C., however, they became crinkled and did not return to normal even on the resumption of cooler conditions, and there was little further extension of infection, even though the host tissue continued to grow and looked healthy, except for a small, brown spot at the site of the infected area. In a subsequent lot of inoculated material mildew again developed on one fragment of tumour tissue and followed a course similar to the foregoing.

It is apparent from these results that *E. cichoracearum* is capable of development on excised, undifferentiated crown gall tissue.

Bryner (W.) & Kundert (J.). **Spritzversuche zur Bekämpfung der Zinkmangelkrankheit im Obstbau.** [Spraying experiments for the control of zinc deficiency disease in fruit culture.]—*Annu. agric. Suisse*, (54) N.S. 2, 1, pp. 87–100, 1 fig., 1953. [French summary.]

Zinc deficiency has become increasingly prevalent in Swiss orchards [cf. *R.A.M.*, 31, p. 494] since 1942, and spraying experiments for its control were carried out on 66 apple trees from 1946 to 1950, inclusive, at the Wädenswil Experiment Station, Zürich. During the dormant period 4 per cent. zinc sulphate was used in conjunction with 6 per cent. carbolineum, while the summer schedule was based on a combination of lime-sulphur and zinc sulphate in an approximate ratio of 3:1. An appreciable improvement was effected by the treatment, but the statistical evaluation of the results showed irregularities which pointed to the implication of unknown factors besides zinc deficiency in the etiology of the symptoms.

Landar (E. G.). Роль микроэлементов в повышении устойчивости Яблони к поражению черным раком. [The rôle of microelements in increasing Apple tree resistance to leaf spot infection.]—Сад и Огород [*Orchard & Garden*], *1953*, 8, pp. 19–21, 1953.

In studies at the Umansky Institute of Agriculture, U.S.S.R., in 1951 apple leaf spot [*Physalospora obtusa*: *R.A.M.*, 17, p. 688] was best controlled by applications of magnesium borate (1 to 2 kg.) and manganese fertilizers (2 to 4 kg.), which retained their effectiveness even in the second year. Neither fertilizer had any adverse effect on the trees and both proved outstanding at the higher concentrations, reducing canker-wound development four to five times compared with the control receiving no fertilizer.

Schuch (K.). **Über die Schädigung von lagerndem Obst durch ein bifluoridhaltiges Holzschutzmittel.** [On the damage to fruit in storage caused by a timber protective containing bifluoride.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 4, 9, pp. 136–137, 1952.

Of recent years heavy losses of fruit in store-rooms treated with insecticides containing hydrofluoric acid have occurred in Germany, one such case being reported by Fischer in *Gesunde Pflanzen*, 3, pp. 133–134, 1951. In experiments at the Institute for Applied Mycology and Timber Protection, Hann.-Münden, several varieties of apples stored in spruce wood boxes treated three weeks earlier with 20 per cent. osmol WB (based on bifluoride) [*R.A.M.*, 30, p. 297] developed extensive spoilage. Seven months after the application of the chemical no damage was observed, but the exact duration of the period conferring complete freedom from risk remains to be determined. Magnesium silicofluoride [30, p. 500] at the same strength was innocuous.

Winter (H. F.) & Young (H. C.). **Control of fire blight of Apples in Ohio in 1953.**—*Plant Dis. Reptr*, 37, 9, pp. 463–464, 1953. [Multilithed.]

At the Department of Botany and Plant Pathology, Ohio Agricultural Experiment Station, Wooster, experiments for the control of apple fire blight (*Erwinia amylovora*) [*R.A.M.*, 32, p. 568] were carried out in 1952 and 1953. Three to five sprays of streptomycin [33, p. 94] or terramycin (60 to 200 p.p.m.) on successive days were effective in preventing infection on young Jonathan apple trees in the greenhouse when twigs were needle-inoculated on the day of the last spray. Trees inoculated seven days after the last spray, however, developed 100 per cent. infection. In the orchard inoculation was carried out at full bloom with a suspension consisting of 10 l. of a three-day culture of *E. amylovora* in nutrient broth and 10 lb. pyrophyllite in 300 gals. water, using a high pressure (600 lb. per sq. in.) power sprayer. Trees given three applications (early and full bloom and petal fall) of streptomycin at 60 and 120 p.p.m. with 2 oz. triton B–1956 (per 100 gals. water) were in excellent condition 17 days after inoculation with only a few infections, the unsprayed being severely blighted.

Schad (C.) & Grente (J.). **Le dépérissement du Pommier.** [Apple tree wilt.]—*C.R. Acad. Agric. Fr.*, 38 [39], 14, pp. 571–574, 1952.

A wilt has been observed since 1936 on Canada Pippin apple trees grafted on Noir de Monton in irrigated meadow orchards in the Veyre Valley, Puy-de-Dôme, in both meadow and unturfed orchards in Gard, Savoy, and the Aosta Valley (Italy), in Cher on the varieties Cravert and Mans Pippin, and on self-rooted trees in the Beda Valley. In earlier studies it was attributed to nitrogen deficiency [*R.A.M.*, 27, p. 424]. The present authors, however, discovered that the fibrous roots of wilted trees were reduced, the rootlets being brown or quite dead, the tips falling

away readily, and few new roots being produced. Some affected roots bore reddish lesions confined to the cortex, from which a *Fusarium* with slightly curved spores and no basal cell was isolated; on others were brown bark lesions and longitudinal black streaks in the wood which yielded a hyphomycete similar to *Ramularia*.

All the strains isolated were tested on the Malling stocks II, VII, and IX, and on Noir de Monton by inserting culture fragments in incisions in the roots extending to the wood or by placing naturally infected root fragments near young healthy roots. Most of the strains of each fungus were pathogenic, producing typical lesions from which the fungi were reisolated. Noir de Monton and IX were the most susceptible, which accounts for the severity of the disease in the Veyre Valley where the former is employed almost exclusively.

These results tend to the conclusion that the fungus lives saprophytically in the soil and enters through the fibrous roots, the disease gaining the upper hand only when environmental conditions do not favour root production. Provided that the tree still has sufficient functional roots the application of nitrogenous organic fertilizers will confer benefit by encouraging root growth. The disease is usually confined to clay soils, especially where they are over-irrigated.

Control should be directed towards (*a*) protecting the roots from attack by disinfecting the soil and improving its physical properties and (*b*) encouraging the production of new roots by the abundant application of farm or liquid manure. Unturfed orchards with or without green manure are superior in soil quality to meadow-orchards.

Kearns (H. G. H.), Marsh (R. W.), & Morgan (N. G.). **Spray application problems : VI. Preliminary field experiments on the control of Apple scab by small-volume sprays.**—*Rep. agric. hort. Res. Sta. Bristol, 1952*, pp. 90–95, 2 diags., 1952.

In experiments carried out at Long Ashton Research Station in 1952 on the control of apple scab [*Venturia inaequalis*: *R.A.M.*, 33, p. 92 and next abstract] the conventional large-volume 1 per cent. lime-sulphur spray was compared with (*a*) 2 and 4 per cent. lime-sulphur at half- and quarter-volume, respectively, on Worcester Pearmain and (*b*) small-volume application (also at 1 per cent.) by means of an air-flow machine on Cox's Orange Pippin. The hand-directed, large-volume spray gave the best control on both varieties, resulting in an average of 0·021 (Worcesters) and 0·03 (Cox) per cent. scabbed leaf area compared with 0·53 for the half-volume, 0·36 for the quarter, and 0·29 for the small-volume, as against 3·15 for the unsprayed.

The quarter- and half-volume sprays, respectively, reduced fruit infection from 3·15 per cent. scabbed area on the unsprayed to 0·36 and 0·53 compared with 0·21 for the small-volume, but the 4 per cent. strength resulted in a serious fruit drop (20 apples per tree).

The control obtained by the small-volume applications would be considered satisfactory in commercial practice and caused no damage on the sensitive Cox.

Byrde (R. J. W.) & Fielding (A. H.). **Spraying experiments against Apple and Pear scab at Long Ashton, 1952.**—*Rep. agric. hort. Res. Sta. Bristol, 1952*, pp. 103–109, 1952.

In further spraying trials at Long Ashton Research Station against apple and pear scab [*Venturia inaequalis* and *V. pirina*: see preceding and next abstracts] in 1952 three applications of lime-sulphur (2 per cent. pre-blossom and 1 per cent. post), phenyl mercury acetate, and phenyl mercury chloride (both at 0·0032 per cent. mercury) were equally effective on Worcester Pearmain apples, the mean percentage area scabbed ranging from 0·24 to 0·61 per leaf and from 0·01 to 0·19

per fruit compared with 1·56 and 1·16, respectively, for the untreated. Captan (0·2 per cent.) was as good as lime-sulphur on Worcester (no fruit infection compared with 0·46 on the unsprayed); on Cox's Orange Pippin captan gave 0·08 per cent. scabbed fruit area compared with 0·09 for lime-sulphur and 1·83 for the untreated. Similarly, 341 SC (0·375 per cent.) proved equal to lime-sulphur on Cox, scab per cent. averaging, respectively, 0·04 and 0·03 per leaf and 0·12 and 0·09 per fruit, as against 0·61 and 3·39 for the untreated.

Cox's Orange sprayed with lime-sulphur for the past three years had significantly less mildew (*Podosphaera leucotricha*) [*R.A.M.*, 24, p. 193], i.e., 15 per cent. shoots infected, than those given 341 SC (36·8) or unsprayed (42). There was a marked build-up of the disease during the three years where glyoxalidines had been substituted for lime-sulphur.

Reduction in yield was caused by lime-sulphur on Cox but none of the other fungicides appeared to affect the crops of apples or pears. The figures in the pear scab control trial [33, p. 93] yielded no significant differences.

Mallinjoud (H. M.) & Viollet (C.). **Lutte contre la tavelure du Poirier en Savoie.** [Control of Pear scab in Savoy.]—*Rev. hort., Paris*, 125, 2196, pp. 970–971, 2 figs., 1953.

An orchard of 1,700 pear trees of three different varieties situated in the plain of Albanais, Haute-Savoie, France, at an altitude of 342 m. was given seven fungicidal applications (two of 50 per cent. copper oxychloride, one of wettable sulphur, three of zineb, and one of copper sulphate plus lime) against scab [*Venturia pirina*: *R.A.M.*, 29, p. 217 and preceding abstract] between 23rd March and 29th June [? 1953]. The cost of spraying (plus two insecticidal treatments) was 57,600 fr. or 9·7 fr. per kg. yield, which was 6,000 kg., having been reduced to about half the normal figure by frosts. In this region it is believed that primary infections come from conidia on branch cankers since they occur before the first ascospore projections (mid-April), the heavy dews at this time being sufficient for conidial dissemination and infection. The crucial time, however, is during flowering, particularly if this is prolonged by damp, cool, weather.

On 30th June the first spots (fruit) to appear on 25 per cent. of the sprayed trees all disappeared in spite of 36 mm. rain on 29th and 30th immediately after spraying; the fruits on the unsprayed were covered with pinhead spots.

The authors conclude that the best fungicide to use preventively against *V. pirina* from bud burst to petal-fall is copper. After this a curative spray is required; in this experiment zineb had a curative effect, but further confirmation is required. Locally, preventive applications of copper fungicides during May and June are not recommended.

Willison (R. S.) & Weintraub (M.). **Studies on stone-fruit viruses in cucurbit hosts. II. Some factors affecting the aging of inoculum in vitro. III. The effect of cucurbit extracts on infectivity.**—*Phytopathology*, 43, 6, pp. 324–328, 328–332, 8 graphs, 1953.

At the Dominion Laboratory of Plant Pathology, St. Catharines, Ontario, the viruses of prune [plum] dwarf, green ring mottle on *Prunus*, necrotic ring spot [see above, p. 139] on plum and cherry, recurrent ring pattern on sour cherry, and cherry tatter leaf and yellows [loc. cit.] were transmitted to cucumber, vegetable marrow, and pumpkin [*R.A.M.*, 30, p. 616; 33, p. 34]. The longevity and behaviour during ageing *in vitro* varied with the isolate used, the temperature of storage of inoculum, its age and source, pre- and post-inoculation conditions during the growth of source plants, and dilution. Infectivity was usually lost in periods of hours rather than of days. Two isolates, one in the green

ring mottle group and the other in the tatter leaf, differed so markedly from the rest as to suggest their classification as strains of an unrelated virus.

Inhibitory substances capable of producing an initial depression or delay in the infectivity of some of the isolates were present in the three above-mentioned cucurbits [32, p. 298] and Hubbard squash, while other strains were not affected. The retardation may be followed by either a further reduction or a striking increase of infectivity. The extent of the early set-back and the subsequent behaviour of infectivity vary, not only with the isolate itself, but also with the virus-host complex used as the source of inoculum. The one or more inhibitors present in the cucurbits appear to lose their efficacy in a few hours, releasing the viruses in an active form.

DELMAS (H. G.). **L'Oidium de l'Abricotier en Roussillon.** [*Oidium* of Apricot trees in Roussillon.]—*Ann. Inst. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 4, 1, pp. 59–89, 12 figs., 2 diags., 1953.

In Roussillon (eastern Pyrenees), France, apricot mildew (*Podosphaera* [*clandestina* var.] *tridactyla*) [*R.A.M.*, 5, p. 699; 28, p. 6; 32, p. 342] frequently causes important losses [8, p. 150]. Infections develop on young fruits, sometimes as early as mid-April, and in rare instances, if the fruit is very young, the epidermis at the site of the lesion may become necrotic, hard, and cracked, the fruit becoming deformed. On 'wilting' trees [11, p. 791 and next abstract] the fruits become diseased at a much earlier stage than those on previously healthy trees. Except on 'wilting' trees, the leaves become affected later. The entire blade becomes diseased on both surfaces. In severe attacks the leaves are contorted and fold over longitudinally, and large areas of the blade die and wither. Premature leaf fall is frequent. Severe secondary infection by *Puccinia pruni-spinosae* [see next abstract] often occurs. There was no evidence of any varietal resistance to mildew.

In laboratory tests with potted plants the conidia, kept at 19° C. and frequently wetted, gave rise to mycelium in a few days or without wetting caused infection in about one week in a relative humidity of about 60 per cent. It would appear, therefore, that moisture plays only a secondary role in epidemiology of this disease, whereas from a study of disease development in different years temperature appears to be the most important factor.

In spring the disease appears in scattered orchards, but by the autumn few orchards remain unaffected. At Toulouges the first spots were observed on 28th April, 1950, 2nd May, 1951, and 18th April, 1952, so that large-scale attack occurred at the beginning of May, 1950, early in June, 1951, and at the end of April, 1952. In 1950 and 1952 infection spread over the whole orchard in about a week, whereas in 1951 there was no serious damage until the beginning of June, and even then it was much less general. In 1952 perithecia were present on partly withered leaves at the end of July.

Overwintering by means of active mycelium bearing conidia on 'wilting' trees (highly susceptible to infection) is very important. When winter temperatures seldom fall below zero 'wilting' trees remain in leaf during the whole winter, spots of active mycelium being present all the time. Locally, for long periods during winter the temperature may be 20°, with the result that successive infections can occur. Further, in some orchards more than one-third of the trees come into leaf prematurely. Perithecial germination is not likely to be important as a cause of heavy spring infection, since the ascospores are liberated with difficulty. In colder regions, where the trees are leafless in winter, overwintering takes place by means of the perithecia, and this partly explains why fruit infections do not occur in these areas.

Comparative spraying and dusting tests with different materials, carried out in 1951 on Rouge de Roussillon, showed that leaf infection was satisfactorily con-

trolled (preventively) by micronized wettable sulphur containing 80 per cent. free sulphur (particle size 1 to 6 μ) or as a 40 per cent. dust. The first application was made on 21st May, the wettable powder being used at the rate of 0·75 kg. per hl. with 0·2 kg. synthetic wetter not containing terpineol. A second application was made on 15th June, using 1·5 kg. per hl. and 0·3 kg. wetter (this amount of wetter later being found excessive). On 27th June, the sprayed, dusted, and untreated trees had, respectively, 81, 70, and 0 per cent. healthy leaves.

In 1952, trees of the Bulida variety treated on 21st April and 9th May with 1 per cent. wettable micronized sulphur spray, micronized sulphur dust, or untreated had, respectively, 99, 93, and 52 per cent. clean fruits. In another orchard of 21 Rouge de Roussillon trees, which had become badly infected, curative methods were adopted; a 9·8 per cent. dye with a methylbenzene-azodiamino-benzene base at 0·15 kg. per hl. or potassium permanganate (0·2 kg. plus wetter) was applied on the morning of 3rd May; the same evening some of the treated and untreated trees were given an application of 1 per cent. micronized wettable sulphur plus wetter. By 7th May the mycelium on the fruits treated with the dye had either lost its virulence or disappeared; the dye appeared to be approximately as effective when used alone as when followed by sulphur, but later the mycelium developed more rapidly on the fruits treated with dye only. Permanganate followed by sulphur was almost equally effective. Trees treated with the dye alone, or plus sulphur, permanganate plus sulphur, and untreated had, respectively, 26, 11, 9, and 7 per cent. clean fruit, 14, 28, 17, and 93 per cent. fruits on which the mycelium appeared to be unaffected, and 60, 61, 74, and 0 per cent. fruits on which the mycelium appeared to have been arrested.

Micronized sulphur in the form of a spray or thin paste is considered to be the most suitable product to use preventively, provided the dosage is not under 1 kg. per hl. Sulphur damage to apricot trees does not occur locally. As only about 10 per cent. of the fruit is canned the question of sulphur injury to metal containers is not, locally, of the first importance; it could probably be obviated by ceasing treatment one month before harvest. Further work is to be carried out on this point. As the mycelium develops on those parts of the fruit which have not been reached by the spray, a wetter at 190 drops per 5 ml. should be used; this corresponds to about 200 gm. of synthetic wetter. If more is used, the fluid runs too freely. The first treatment should be applied, under local conditions, about the middle of April, a second 10 to 15 days later. In certain cases a third application may be made in a fortnight provided harvesting is not too near. If the disease has already appeared, spread can be arrested by applying potassium permanganate or an appropriate dye followed by sulphur.

Delmas (H. G.). **Quelques aspects de la culture de l'Abricotier en France.** [Some aspects of Apricot cultivation in France.]—*Fruits d'outre-mer*, 7, 7, pp. 311–323, 5 figs., 4 graphs, 1952.

Notes are given on some diseases of apricots in Roussillon, eastern Pyrenees, France. *Sclerotinia laxa* [C.M.I. map No. 44; *R.A.M.*, 27, p. 430] is controlled by spraying with 2 per cent. Bordeaux at green bud, bud-burst, soon after sepal-fall (about 15 days after flowering), and six weeks to a month before maturity of the first fruits. Micronized sulphur may replace the later sprays to avoid burning. Shot-hole (*Clasterosporium carpophilum*) [C.M.I. map No. 188] is countered by a dormant spray with 2 per cent. Bordeaux and three applications at 0·5 to 1 per cent. roughly every three weeks throughout the growing period. Trees grafted on myrobalan [*Prunus cerasifera*] are particularly susceptible to rust (*Puccinia pruni-spinosae*) [see preceding abstract]. At present Bordeaux is recommended for control until results with micronized sulphur are confirmed. *Armillaria mellea* [*R.A.M.*, 33, p. 36] and *Dematophora* [*Rosellinia*] *necatrix* [5, p. 305] produce root

rots which often prove fatal. *Verticillium dahliae* [12, p. 76] causes a wilt similar to the final stages of apoplexy. Entire orchards may be destroyed by a wilt [cf. preceding abstract], probably of virus origin, which takes the form of apoplexy on self-rooted trees and those grafted on peach, but is much more gradual on apricots grafted on plum [27, p. 570], several years sometimes elapsing before death of the tree. The symptoms of premature budding, interveinal chlorosis, thickening, brittleness, and marginal rolling of the leaves, and phloem necrosis typical of apricot on plum stocks were transmitted by bud-grafting. Until the virus nature of the disorder is confirmed scions should be chosen from healthy-looking trees.

Kunze (L.). **Die Pfeffinger Kirschbaum-Krankheit auch am Mittelrhein.** [The Pfeffinger Cherry tree disease in the mid-Rhineland too.]—*Pflanzenschutz*, 5, 1, pp. 4–7, 3 figs., 1953.

Published information on the Pfeffinger virus disease of sweet cherries [*R.A.M.*, 32, p. 386] is summarized in connexion with its discovery in the summer of 1952 on the left bank of the Rhine, between Bonn and Cologne [cf. 31, p. 128 and next abstract]. The disease appears to be too firmly entrenched for control by eradication, but many sources of infection could be eliminated by the removal during the winter of all dying or unproductive trees, as well as of young ones with definite symptoms, and replanting at a reasonable distance from the cleared areas.

Some observations are made on other cherry disorders suspected to be of virus origin in western Germany.

Thiem (H.). **Über Abbaukrankheiten bei Süß- und Sauerkirschen.** [On degeneration diseases of sweet and sour Cherries.]—*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 5, 5, pp. 65–70, 10 figs., 1953.

Various manifestations of virus infection in cherry trees in Rhineland, Germany, are described, including enations and extreme narrowing of the leaves in sweet cherries and a rosette disease resembling Pfeffinger [see preceding abstract] in sour.

Sergeeva (Mme K. D.). Сферотекоустойчивые, черноплодные формы Крыжовника. [*Sphaerotheca*-resistant, black-fruit forms of Gooseberry.]—Сад и Огород [*Orchard & Garden*], *1953*, 9, pp. 67–68, 1 fig., 1953.

A new, high-yielding gooseberry hybrid, No. 21–52, resistant to *Sphaerotheca* [*mors-uvae*: *R.A.M.*, 31, p. 130 and following abstracts], has been developed in the U.S.S.R. by pollinating a hybrid of two wild gooseberry species with mixed pollen from the large-fruited European varieties Green Finik, Butuilochnuy, and Industry.

D'Yakonova (Mme E.). Борьба с пучнистой росой на Крыжовнике. [Control of powdery mildew of Gooseberry.]—Сад и Огород [*Orchard & Garden*], *1953*, 8, pp. 71–72, 1953.

Spraying experiments against gooseberry powdery mildew [*Sphaerotheca mors-uvae*: see preceding and next abstracts] were carried out in the U.S.S.R. in 1951. Copper sprays (4 per cent.) on dormant bushes and the soil beneath immediately after the snow-thaw, with applications of manure [*R.A.M.*, 31, p. 129], further sprays before the infection appears or soon after, and then every 10 to 12 days in warm, rainy weather or 20 to 25 days in colder, dry weather until infection disappears completely, give satisfactory control. Where infection is severe the burning of infected berries and leaves and the removal of suckers are recommended.

Kulikov (V. A.). Термический метод борьвы с мучнистой россой Крыжовника. [A thermal method of controlling powdery mildew of Gooseberry.]—Сад и Огород [*Orchard & Garden*], *1953*, 8, pp. 72–74, 2 figs., 1953.

Treatment of gooseberry bushes in the U.S.S.R. by spraying with hot water

(75° and 80° [C.]) containing 1 gm. sodium arsenate per pail of water gave promising control of powdery mildew [*Sphaerotheca mors-uvae*: see preceding and next abstracts] in tests from 1947 to 1951, resulting in 2·2 per cent. infected shoots at 75° as against 23·6 (for those treated with 0·02 per cent. [? cold] sodium arsenate solution) and at 80° 0·1 as against 22·1 (untreated). The 75° treatment also reduced berry infection from 50 per cent. (sprayed with water at normal temperature plus 4 gm. sodium arsenate) to 14·7 per cent. The sprayer should be kept about 5 to 20 cm. away from the bush, depending on the type of machine, the diameter of the opening, and the initial temperature of the solution.

The advantage of the hot-water method is that two sprays are sufficient to give satisfactory control, whereas other treatments require four sprays.

Junker (H.). **Zur Bekämpfung des Amerikanischen Stachelbeermehltaues.** [On the control of the American Gooseberry mildew.]—*Pflanzenschutz*, 5, 1, pp. 7–8, 1953.

Gooseberry bushes in a heavily infected area of a Bavarian nursery were sprayed against *Sphaerotheca mors-uvae* [*R.A.M.*, 29, p. 34 and preceding abstracts] on 5th March, 1952, when the buds were beginning to swell, with 1·5 per cent. lutin, selinon neu [30, p. 616] at the same strength, 6 per cent. diodendrin, or 10 per cent. lime-sulphur, others being treated on the 24th, just before the buds opened, with 2 per cent. Bordeaux mixture. On 27th June the percentages of shoot infection on two untreated plots were 76·6 and 79·9 and on those sprayed with Bordeaux mixture, lime-sulphur, diodendrin, selinon neu, and lutin 59·5, 46·6, 33·3, 46·6, and 26·7, respectively, the corresponding figures for fruit infection being 79·9, 69·9, 59·9, 36·7, 6·7, 26·7, and 16·7. On 17th September 16·7 and 20 per cent. of the unsprayed bushes were still in full leaf, 6·7 of those sprayed with Bordeaux mixture, and 53·3, 50, 26·7, and 59·9 respectively, in the plots treated with lime-sulphur, diodendrin, selinon neu, and lutin.

Kearns (H. G. H.) & Morgan (N. G.). **Spray application problems : V. The automatic low-pressure spraying of small bush fruit.**—*Rep. agric. hort. Res. Sta. Bristol, 1952*, pp. 95–98, 2 pl., 1952.

The spraying of black currants and dwarf-pyramid and cordon apples by hydraulic automatic machinery at low pressures was satisfactorily carried out at Long Ashton Research Station at one-third of the inclusive cost of lance spraying. The machine, which consists of a chassis on two pneumatic-tyred wheels, gear pump (in preference to a reciprocating pump) and countershaft, very large suction filter, water raiser, agitator, spray gates, and tractor power-take-off drive, gave satisfactory results when it was fitted with a simple gear pump having a throughput of 18 to 20 gals. per minute at 75 lb. per sq. in. pressure.

Spangelo (L. P. S.) & Bolton (A. T.). **Suggested infection scales for roguing Strawberry seedlings susceptible to Mycosphaerella fragariae and Diplocarpon earliana.**—*Phytopathology*, 43, 6, pp. 345–346, 2 figs., 1953.

In the strawberry-breeding programme of the Division of Horticulture, Central Experimental Farm, Ottawa, Canada, the roguing of seedlings susceptible to leaf spot (*Mycosphaerella fragariae*) and leaf scorch (*Diplocarpon earliana*) [*R.A.M.*, 31, p. 442] has been facilitated by the photographic definition of six infection classes, of which the most commonly used are highly, moderately, and slightly susceptible. The disease rating of each seedling is based on the most heavily infected leaf and is made during the late autumn of the year before the first fruiting season. Leaf spot is typified by lesions with a greyish-white centre of conidiophores and leaf scorch by the presence of acervuli on the diseased areas [loc. cit.].

Brun (J.). **Sur quelques parasites responsables des anthracnoses de la Papaye.** [On some parasites causing anthracnoses of Papaw.]—*Fruits d'outre-mer*, 7, 6, pp. 271–272, 1 fig., 1952.

In French Guinea papaw anthracnose is caused by *Glomerella cingulata* [cf. *R.A.M.*, 15, p. 343; 32, p. 118], which causes greater injury than any other fungus locally. Green fruits in which incisions have been made for the extraction of papain develop what is provisionally identified as the conidial state (*Colletotrichum gloeosporioides*) [cf. 27, p. 483]. Ripening fruits are also infected by another species of *Colletotrichum* [cf. 32, p. 684], which has black, shining acervuli with numerous dark brown setae, pointed at the tip, usually multi-septate, always swollen at the base, and about 80 to 150 μ long. The hyaline, simple, falcate spores have a pediform base, and resemble young, not yet septate *Fusarium* spores. They are borne on simple, hyaline, multi-septate conidiophores arising from a thick stroma of isodiametrical brown cells.

Papaws for export to France should be disinfected before despatch with shirlan A.G. or shirlan W.S. The trees should be sprayed during growth with 1 per cent. Bordeaux mixture, and diseased fruits lying on the ground should be removed.

Lal (A.) & Singh (R. P.). **Anthracnose disease of Carissa carandas Linn. caused by Colletotrichum inamdarii.**—*J. Indian bot. Soc.*, 32, 1–2, pp. 54–63, 3 figs., 1 graph, 1953.

An anthracnose leaf spot of *Carissa carandas*, cultivated in India for its fruits and for fencing, caused by *Colletotrichum inamdarii* n.sp. is widely distributed in various parts of the Uttar Pradesh. The hyaline, bacilliform, straight, thin-walled, non-septate conidia with two or more refractive globules measured 11 to 26 by 2·98 by 5·56 μ. The setae average 30·5 μ. Optimum growth in culture occurred at 27° C. and pH 7, sucrose being the best source of sugar and sodium nitrate of nitrogen.

Although the fungus is normally a wound parasite it infects uninjured leaves when the inoculum is suspended in an extract of the host. In nature normal infection is stimulated by exudation from wounds caused by the thorns. In unfavourable conditions the fungus perennates as a mycelium. As 0·1 per cent. copper sulphate solution checked mycelial growth and spore germination, sprays of this material are recommended for use in cases of severe infection.

Maan (W. J.). **5 jaren landbouwluchtvaart.** [Five years of agricultural aviation.]—*Meded. Dir. Tuinb.*, 15, pp. 953–958, 1 fig., 1952. [English summary.]

Progress since 1948 in the use of aircraft for agricultural purposes, e.g., the application of fungicides [*R.A.M.*, 33, p. 109] is briefly reviewed [cf. 31, p. 393]. A helicopter of the Sikorsky S 51 type had already been acquired in Holland in 1947, and in 1948 spraying experiments with fixed-wing planes, such as the Stinson Vigilant, were also initiated to obtain information on the technical and economic aspects of the operations. The results led to the formation of a private company, and in 1952 aerial spraying was carried out over 11,000 ha. in Holland—a relatively larger area than in any other European country. Further developments in this mode of combating diseases and pests may be anticipated with the release for civil use of improved types of helicopter.

Zeumer (H.) & Neuhaus (K.). **Prüfung und Beurteilung von Netzmitteln und Haftmitteln.** [Assay and evaluation of wetters and adhesives.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 5, 11, pp. 168–173, 1 fig., 1953.

Of several commercial wetters and combined wetter-adhesives tested at the Brunswick branch of the German Biological Institute for their influence on the wettability, tenacity, and suspensibility of fungicides, represented by Bordeaux

mixture and copper oxychloride, and insecticides, only one of the wetters, with a polyglycolester base, enhanced wettability in almost every case without impairing the other physical attributes of the mixtures. All the wetter-adhesives acted irregularly. From these results it appears quite feasible to procure an enhancement of wettability for special purposes, e.g., the control of apple mildew [*Podosphaera leucotricha*], by the use of a wetter of suitable composition with a plant-protective mixture.

MARTIN (J. T.). **Spray application problems. I. The distribution of copper and lime-sulphur deposits.**—*Rep. agric. hort. Res. Sta. Bristol, 1952*, pp. 71–74, 1952.

Most of this information on new methods of recording the distribution of copper and lime-sulphur spray deposits on plant surfaces has already been noticed from another source [*R.A.M.*, 32, p. 635]. A description is given of an additional method for assessing lime-sulphur deposits. It consists in mixing anhydrous calcium sulphate (20 gm.) with 1 per cent. thallium sulphate solution (12 ml.) and adding 2·5 per cent. sodium sulphate (4 ml.) when the cream blackens. After use the plaque is bleached by brief immersion in 0·5 per cent. nitric acid and rinsed in water. The deposits are distinguishable by the red-brown markings of thallium polysulphide.

MARTIN (J. T.), BATT (R. F.), & JACKSON (PAULINE). **Spray application problems. II. DDT and copper residues on soft fruits.**—*Rep. agric. hort. Res. Sta. Bristol, 1952*, pp. 75–83, 2 pl., 1952.

In further studies in this series at Long Ashton Research Station [see preceding abstract] preliminary tests were carried out to determine the amount of copper residue on glasshouse tomatoes sprayed with copper oxychloride. Appreciable residues, higher on the foliage than on the fruit, were detected when samples were analysed immediately after the sprays containing 0·125 or 0·25 per cent. copper (each applied twice) had dried, there being an appreciable build-up after the second.

On outdoor plants sprayed with colloidal copper (0·06 per cent. copper) and subjected to normal weathering much of this copper deposit was lost between successive treatments under wet conditions.

CUNNINGHAM (G. H.). **Certification of therapeutants.**—*Orchard., N.Z.*, 26, *Suppl.*, 4 pp., 1953.

This is the 33rd list of certified therapeutants from the New Zealand Plant Diseases Division, which cancels all previous lists [cf. *R.A.M.*, 32, p. 576].

OWENS (R. G.). **Studies on the nature of fungicidal action. II. Chemical constitution of benzenoid and quinonoid compounds in relation to fungitoxicity and inhibition of amino- and sulfhydryl-dependent enzymes.**—*Contr. Boyce Thompson Inst.*, 17, 4, pp. 273–282, 1953.

Further studies in this series [*R.A.M.*, 33, p. 39] were concerned with variations in the fungitoxicity and inhibition of pancreatic and malt amylases [loc. cit.] accompanying changes in the molecular constitution of 27 benzenoid, quinonoid, and naphthoquinonoid ring compounds. Benzenoid compounds were inactive against amylases; 3,4-dichlorotoluene was highly active against spores of *Monilinia* [*Sclerotinia*] *fructicola* and *Alternaria oleracea* [*A. brassicicola*: 32, p. 577]. Hydro-, benzo-, and naphthoquinones generally inhibited both enzymes. Substitution of hydrogen by chlorine increased inhibition, 2,5-dichlorohydroquinone being particularly fungitoxic, whereas methylation or hydroxylation decreased it. Fungitoxicity was increased parallel with amylase inhibition by chlorination of benzoquinone, 1,4-naphthoquinone, and hydroquinone. Methylation usually enhanced

or failed to affect fungitoxicity but reduced amylase inhibition. The 1,4-naphthoquinones were particularly fungitoxic while the corresponding benzoquinones were more inhibitory to amylases.

The possible influence of the larger ring structure of 1,4-naphthoquinones and of methylation of benzoquinones on chemical stability and permeation of spores is discussed as a possible basis for discrepancies between the relative fungitoxic action of these compounds and their inhibition of amylases.

ØHLERS (H.). **Oversigt over forskellige bekaempelsesmidler m.m.** [Synopsis of various plant protectives and the like.]—Reprinted from *Erhvervsfrugtavleren, 1953*, 5–6, 6 pp., 1953.

The following information on the fungicides, insecticides, spreaders, and other remedial preparations (officially sanctioned and otherwise) used in Danish orchards is presented in parallel columns: percentage of active material, price per kg. (in kroner), size of packing, concentrations for application before and after flowering, cost of 1,000 l. prepared mixture, diseases and pests controllable, observations, and name of the supplying firm.

THORN (G. D.), LUDWIG (R. A.), & MILLER (D. M.). **A patent fungicide from disodium ethylenebisdithiocarbamate.**—Abs. in *Chem. in Canada*, 5, 5, p. 43, 1953.

The precipitate from aerated solutions of nabam [*R.A.M.*, 32, p. 635] had an ED 50 value between 15 and 25 p.p.m. in tests against *Sclerotinia fructicola* by the spore drop assay technique. It contains 10 to 20 per cent. ethylene thiuram monosulphide and about 15 per cent. sulphur, the remainder probably consisting of polyethylene thiuram monosulphide, a new compound with an ED 50 value between 1 and 1·5 p.p.m.

Some further definitions of terms used in plant pathology.—*Trans. Brit. mycol. Soc.*, 36, 3, p. 267, 1953.

Additions to the definitions of plant pathological terms approved by the Plant Pathology Committee of the British Mycological Society [*R.A.M.*, 29, p. 520] include: ecoclimate, the climate within a plant community, e.g., a crop; infection gradient, the change in incidence of disease with distance from a source of infection; index of prevalence, the proportion of stands affected by a disease in a defined area; and toxicity, the power of acting as a poison.

BÄRNER (J.). **Bibliographie der Pflanzenschutzliteratur 1940–1945.** [Bibliography of plant protection literature 1940 to 1945.]—xlviii+1308 pp. (2 volumes), Berlin, Paul Parey, 1953.

In the general part (pp. 1–27) of a further instalment of this useful publication of the German Biological Institute [cf. *R.A.M.*, 17, p. 336; 29, p. 421] are listed the titles of compilations and treatises, reports and congresses, and bibliographies issued from 1940 to 1945, while the second part (pp. 28–242) is headed 'diseases and causes', the third (pp. 243–1054) 'diseases and host plants', and the fourth (pp. 1055–1220) 'measures of plant protection'. The author index covers the section from pp. 1221 to 1308. English and French translations of the introduction, table of contents, and headings and subheadings are supplied.

FUNDER (S.). **Practical mycology. Manual for identification of fungi.**—146 pp., 190 figs., Oslo, Norway, Brøggers Boktr. Forlag, 1953.

Parts I and II of this elementary treatise are headed, respectively, 'Introduction to Mycology' and 'The Identification of Fungi by Microscopic Examination'. Each comprises three sections which in Part I are concerned with fundamentals of

elementary mycology, the classification of fungi, and laboratory methods, and in Part II with fungi of particular interest in general mycology, medical mycology (incorporating a key to the human mycoses by M. A. Gordon), and plant pathology. Part III consists of a table of classification of the 122 species dealt with, a bibliography of 26 titles, a glossary, and an index. There are line drawings of the salient features of the 122 species, some of which are repeated in the appropriate places.

LeClerg (E. L.). **Seed-borne plant pathogens.**—*Plant Dis. Reptr*, 37, 9, pp. 485–492, 1953. [Multilithed.]

The author lists alphabetically under host names the plant pathogens borne on or in true seed [*R.A.M.*, 26, p. 405; 32, p. 656], or accompanying vegetative reproductive organs.

Nance (Nellie W.). **Some new and important plant disease occurrences and developments in the United States in 1952.**—*Plant Dis. Reptr, Suppl.* 220, pp. 72–103, 8 maps, 1953. [Multilithed.]

This summary of the outstanding disease occurrences in the United States in 1952 [cf. *R.A.M.*, 32, p. 635] contains some 1951 reports which were not included in the previous summary [loc. cit.]. Most of the information, obtained from reports to the Plant Disease Survey and from *Phytopathology*, has already been noticed in this *Review*.

Hyde (H. A.) & Williams (D. A.). **The incidence of Cladosporium herbarum in the outdoor air at Cardiff, 1949–50.**—*Trans. Brit. mycol. Soc.*, 36, 3, pp. 260–266, 3 graphs, 1953.

Cladosporium herbarum was the most abundant mould trapped on agar plates exposed on the roof of Llandough Hospital, near Cardiff [cf. *R.A.M.*, 32, p. 392], during 1949 and 1950, its incidence, as summarized week by week, showing a marked seasonal rhythm with a maximum in summer and a minimum in winter. Incidence was markedly higher during the warm, dry summer of 1949 than during the relatively cool, wet summer of 1950. The average numbers of conidia on slides exposed for 24 hours was much lower than was expected from plates exposed simultaneously but for only 10 minutes. From a discussion of the possible causes of this discrepancy it is concluded that it is probably due to a higher incidence at 10 a.m. in the morning when the plates were exposed than the average for the whole 24 hours.

Skerman (V. B. D.) & Dementjewa (Galina). **An improved technique for the preparation of permanent mounts of fungi.**—*Aust. J. Sci.*, 15, 6, p. 218, 1953.

An important modification has been introduced into the technique for the preparation of permanent mounts of fungi previously described from the University of Queensland [*R.A.M.*, 26, p. 499], which greatly enhances its efficiency. The organisms are cultured on slides under cover-slips, and when sufficient development has occurred the slip is removed and the adhering mycelium is mounted *in situ* in celloidin. This method entirely eliminates the possibility of the inclusion of water in the celloidin film, a frequent cause of cloudiness in preparations made by the original procedure.

Reckendorfer (P.). **Ein Beitrag zur Mikrochemie des Rauchschadens durch Fluor. Die Wanderung des Fluors im pflanzlichen Gewebe. II. Teil: die sichtbaren Schäden.** [A contribution to the microchemistry of smoke damage by fluorine. The movement of fluorine in plant tissue. Part II: visible injuries.] —*PflSchBer.*, 10, 7–8, pp. 112–124, 1953. [English summary.]

At the Federal Plant Protection Institute, Vienna, acute and chronic forms of

damage to plants by fluorine-containing industrial fumes [*R.A.M.*, 32, p. 496] were differentiated by the microanalytical assay of the total fluorine and the inorganic and organic fluorine compounds in the tissues, using cherry leaves for the experiments.

Herman (L. G.) & Reed (C. L.). **New coating agent promises mold-free surfaces.**—*Food Engng*, 24, 2, pp. 71–72, 201–203, 1 fig., 1952.

Previous literature on some industrial applications of copper-8-quinolinolate is briefly reviewed and the writers' experiments on the use of the compound for the control of paint moulds [*R.A.M.*, 31, p. 396; cf. 33, p. 44] in a Chicago meat packing plant are described. Added to a potato dextrose agar medium at concentrations ranging from 10 to 100 p.p.m., the chemical inhibited the growth of some 75 moulds (including *Penicillium* and *Aspergillus* spp.) and yeasts commonly found in such locations. Copper-8-quinolinolate is very resistant to heat (up to 400° F.) and to acid and alkaline detergents. Its daily ingestion for three months by white mice at levels containing 180 p.p.m. copper induced no toxic symptoms.

Skinner (F. A.). **Inhibition of Fusarium culmorum by Streptomyces albidoflavus.**—*Nature, Lond.*, 172, 4391, p. 1191, 1953.

An investigation was conducted in the Soil Microbiology Department, Rothamsted Experimental Station, to determine the ability of *Streptomyces albidoflavus* to inhibit the growth of *Fusarium culmorum* under a variety of nutritive conditions [cf. *R.A.M.*, 31, p. 255] and particularly with small amounts of readily available carbohydrate. When grown on a mineral salts agar plus 1 per cent. glucose the fungus was checked by *S. albidoflavus* but not when 0·01 per cent. was added. Slight inhibition on plain agar (pH 7) was increased to strong by sprinkling dried powdered grass over the inoculum, but other organic materials and extracts of them and bentonite reduced or eliminated the inhibition, the last-named also removing the antibiotic activity from culture filtrates and reducing or preventing the lysis of the fungal hyphae by the actinomycete in sand culture. Both antagonism and lysis were directly dependent on the amount of glucose supplied. The fungus was not affected by the actinomycete in sterile soil.

Brian (P. W.), Hemming (H. G.), Moffatt (J. S.), & Unwin (C. H.). **Canescin, an antibiotic produced by Penicillium canescens.**—*Trans. Brit. mycol. Soc.*, 36, 3, pp. 243–247, 1953.

At the Butterwick Research Laboratories, Welwyn, Herts., certain strains of *Penicillium canescens* yielded an antibiotic, canescin, which was only slightly antibacterial but inhibited spore germination of *Botrytis allii* [*R.A.M.*, 32, p. 140], *P. brevicompactum*, *P. stoloniferum*, and *Stachybotrys atra* at 12·5 μgm. per ml., *Fusarium caeruleum*, *F. graminearum* [*Gibberella zeae*], and *Thamnidium elegans* at 25 μgm. per ml., and *P. digitatum* and *P. expansum* at 50 μgm. per ml.

Teillon (J.). **Essai de différenciation biologique des Streptomyces antibiotiques.** [An attempt to differentiate biologically between antibiotic species of *Streptomyces*.]—*Rev. gén. Bot.*, 60, 714, pp. 485–544; 715, pp. 573–608, 4 pl., 2 diags., 10 graphs, 1953.

Classical methods for identifying antibiotic species of *Streptomyces* depend on uncertain morphological and biochemical characters which give no indication of the quality of the antibiotic secreted. The new biological method proposed herein would permit certain forecasts concerning an inhibitor to be made before it was isolated. This method is based on the diffusion of an antibiotic from filter paper disks (9 mm. diameter), impregnated with solutions of known titre of the principal antibiotics known, into agar plates sown with a spore suspension of the *Streptomyces*

being examined. An inhibition zone will develop round the disk if the antibiotic secreted differs from that on the filter paper but there will be none if the antibiotics are identical. Another method is to apply the disk to unseeded agar for one hour, remove it, and place two filter paper strips steeped in a spore suspension tangentially to the disk area for one hour. The plates are then incubated at 28° to 30° C. for three days. This method enabled the author to draw up a dichotomous key for the identification of antibiotics and the determination of their association with a particular biotype. It permitted the recognition of certain actinomycete strains secreting antibiotics already known and led to the discovery of some species which produced antibiotics differing from the six major ones (streptomycin, streptothricin, neomycin, terramycin, aureomycin, and chloromycetin), one active strain being *Streptomyces* T767.

A bibliography of 105 titles is appended.

Hessayon (D. G.). **Fungitoxins in the soil. I. Historical. II. Trichothecin, its production and inactivation in unsterilized soils.**—*Soil Sci.*, 75, 4, pp. 317–327; 5, pp. 395–404, 2 graphs, 1953.

Many of the 69 papers cited in the bibliography appended to the author's historical review of the knowledge of soil fungitoxins have been noticed from time to time in this *Review*. Some of the results of these studies at the University of Manchester on trichothecin in relation to *Fusarium oxysporum* var. *cubense* have already been presented [*R.A.M.*, 31, p. 135]. Unsterilized soil in which *Trichothecium roseum* had been grown exerted a stimulatory effect on *F. o.* var. *cubense*, indicating a much lower production of trichothecin than in sterilized soil. Clay soils were more productive of trichothecin than sandy ones. The antibiotic was strongly adsorbed by soil, but very little biological breakdown ensued. The colonization of unsterilized soil by *T. roseum* was effected by mycelial spread and not by spore germination. All the sterilized soil samples contained a thermostable factor inhibitory to the growth of *T. roseum*, which was likewise retarded by ether extracts of unsterilized soils. The concentration of the thermostable factor was highest in clay and that of the ether-extractable toxins in sand. A low concentration of the latter in a given soil was associated with a high capacity for trichothecin production.

Waggoner (P. E.) & Shaw (R. H.). **Stem and root temperatures.**—*Phytopathology*, 43, 6, pp. 317–318, 2 graphs, 1953.

Pathogens existing at or near soil-level and outside the host for a part of their life-cycle are exposed to considerable variations of temperature. For instance, Geiger has shown in 'The climate near the ground' (Harvard University Press, Cambridge, Massachusetts, 1950) that the temperature of an object lying on the surface of exposed soil may be more than 20° F. warmer during the day and 5° cooler at night than air temperature at 45 cm. above the soil. The observations herein reported from the Iowa Agricultural Experiment Station show that, in contrast, the climate encountered by a pathogen on its entry into the host is temperate.

Temperatures were measured in August by the insertion of wire thermocouples into maize and tomato plants at all levels, the resultant potentials of 16 couples being recorded simultaneously in 80 seconds. It was shown that conditions in the host at soil-level were more temperate than the soil surface environment left by the invading pathogen. Moreover, the climate is also tempered to a lesser degree at depths as low as 8 cm. and at heights up to 5 cm., a matter of importance in relation to the incidence of damping-off. Considering Leach's finding that damage by *Pythium ultimum* to spinach, peas, and beet reaches a maximum at an intermediate temperature range of 54° to 77° [*R.A.M.*, 27, p. 344] in conjunction with

the present observations, it is concluded that the host climate may be more favourable to the occurrence of the disease than either air or soil surface temperatures would suggest.

Another phytopathological problem is elucidated by these studies. The observation that a shaded stem was 12° cooler than the air at the top of the plant gave a clue to the means of survival through a hot period of a pathogen normally killed by high temperatures. Thus, in 1950 potato blight (*Phytophthora infestans*) appeared on a large number of leaves in an Iowa field, but during a spell of hot weather all signs of the disease vanished except for a single stem lesion. On the recurrence of favourable conditions for blight development the fungus, which had probably continued to exist in the cool stems, spread all over the field [32, p. 97]. Evidently, therefore, a fungus is not necessarily eliminated by hot weather, since it may still be alive in an environment with a maximum temperature 12° less than that of the air.

STAMPS (D. JEAN). **Variation in a strain of Phytophthora cactorum.**—*Trans. Brit. mycol. Soc.*, 36, 3, pp. 248–254, 2 pl., 1953.

In the Department of Botany, University of Birmingham, a study was made of the natural variation in culture of a single-zoospore isolate of *Phytophthora cactorum* [*R.A.M.*, 22, p. 455] from onion, which differed from other single-zoospore isolates of the same strain in its slower and more compact growth. On clear maize extract agar at 20° C. a number of variants appeared among further single-zoospore isolates from the original single-zoospore culture and others arose as sectors, differences being recorded in the colony characters, rate of growth, morphology of hyphae, size, appearance, and frequency of reproductive organs, and pathogenicity to apple fruits, one variant being non-pathogenic. The sporangia varied in mean length from 35·5 μ in a rapidly growing variant to 53·6 μ in a slow-growing one, the corresponding figures for oogonial diameter being 22·9 to 34·1 μ. The characters of three of the variants were maintained on the germination of zoospores and oospores; two were stable over a wide range of conditions. Reversion to the original form of the strain from which the first culture was taken occurred in old cultures, upon repeated subculturing of some of the variants, and on germination of zoospores and oospores.

STAMPS (D. JEAN). **Oospore production in paired cultures of Phytophthora species.** —*Trans. Brit. mycol. Soc.*, 36, 3, pp. 255–259, 1 pl., 1953.

In the Department of Botany, University of Birmingham, four strains of *Phytophthora cinnamomi* and five of *P. cryptogea* produced oospores readily in three to six days in dual cultures of opposite species [*R.A.M.*, 27, p. 297], but rarely or not at all when grown alone or paired with the same species. Using a slide culture technique by which the fungi were paired in a very thin layer of clear maize extract agar under a cover slip, thus facilitating the identification of antheridial and oogonial connexions, hybridization was found to occur in the early history of a dual culture, *P. cinnamomi* forming the antheridium and *P. cryptogea* the oogonium. Later some of the *P. cinnamomi* strains formed non-hybrid oospores, apparently stimulated by conditions in the dual culture, since none was found in single cultures of the same age. A sixth *P. cryptogea* strain produced oospores when grown with the other strains of either species.

COCKERHAM (G.) & MCGHEE (T. M. R.). **Potato stunt disease.**—Ex *Rep. Scot. Pl. Breed. Sta.*, 7 pp., 2 pl., 1953.

The stunting disease of potato was first noticed in a Perthshire 'seed' stock of the variety Majestic [*R.A.M.*, 31, p. 628] in 1949 and has been seen once each year since, so is of little economic importance. The disease has been shown to be caused

by a graft- and sap-transmissible virus, producing similar symptoms on a number of varieties. Symptoms include greyish-black, water-soaked, necrotic lesions on the lower leaves of young shoots, which enlarge to fill most of the interveinal areas, causing the leaf to fall. These effects diminish towards the growing point, causing a 'palm tree' appearance. During the advance upwards of necrosis the upper leaves roll inwards and show a typical colour, red, blue, or yellow according to variety.

Infected tubers sprout readily, first appearing healthy though stunted; later the leaves become turgid, chlorotic, rolled, and discoloured with interveinal necrotic spots. Leaves are often malformed, with distorted petioles; in Duke of York plants it looks like a 'multiple leaf' variation.

The virus was transmitted by sap inoculation to *Nicotiana rustica* and Essex Wonder tomato, which were symptomless, and to *Solanum demissum* and *S. nodiflorum*, producing stunting, general chlorosis, and distortion after infection is established; chilli (*Capsicum frutescens*), *Physalis floridana*, and White Burley tobacco became chlorotic, distorted, and stunted.

The virus, though closely related to unmottled curly dwarf virus [loc. cit.], differs in the pronounced necrosis induced in the primary phase and apparent lack of transmission by insect vectors. For the present, therefore, the name potato dwarf virus will be used.

ROLAND (G.). **Étude virologique sur la Pomme de terre. Recherches symptomatologiques et histopathologiques.** [A virological study on the Potato. Symptomatological and histopathological researches.]—*C.R. Inst. Encour. Rech. sci. Brux.* 7, 118 pp., 3 pl., 45 figs., 1952.

After a brief review of the history of research into virus diseases of the potato the author discusses the concept 'virus', defines the chief technical terms used in the present work to describe the reactions of the potato plant to virus attack, explains the meaning of 'variant' and 'strain' as applied to viruses, and describes in detail the results of inoculation experiments carried out from 1943 to 1948 in Belgium in which a study was made of the reaction of 76 potato varieties to viruses X [*R.A.M.*, 29, p. 637], Y [29, p. 177], and A [25, p. 250]. The symptoms produced by each virus on each variety are described in detail and summarized in tabular form. A histological study was made of the tissues involved in the different symptom pictures.

No variety tested was completely immune from virus X, though some were hypersensitive and others symptomless. It is considered that immune varieties should be developed in Belgium. As virus A appears to be very prevalent in Belgium and is difficult to identify, immunity should be a character of all new varieties developed locally. Bintje, Gloria, Meerlander, Record, Saskia, and Wilpo were hypersensitive to both virus X and virus A. Plants with masked or latent infections should be eliminated from a crop. All necrotic tissues contain a melanic substance which gives the same chemical reactions, whatever the origin of the necrosis. Acronecrosis caused by a virus arises in the phloem, in contrast to physiological acronecrosis which affects principally the xylem. In tissues affected by ordinary mosaic the cells and chloroplasts diminish in size, whereas potato aucuba mosaic virus causes a disintegration of the chloroplasts accompanied by increase in cell volume. In these studies it was not possible to use any specific colour reaction of necrotic phloem in leaf roll plants to identify this virus. The work concludes with a bibliography of 186 titles.

SALZMANN (R.). **Über das Totspritzen der Kartoffelstauden als Maßnahme zur Verhinderung der Virusausbreitung.** [On lethal sprays for Potato haulms as a means for the prevention of virus spread.]—*Annu. agric. Suisse*, (54), N.S. 2, 5, pp. 707–738, 6 figs., 1953. [French summary.]

This is a fully tabulated report and discussion of the results of experiments

carried out at the Agricultural Experiment Station, Zürich-Oerlikon, Switzerland, from 1947 to 1952 to determine the value of haulm-killing by chemical sprays in the control of potato viruses [cf. *R.A.M.*, 32, pp. 444, 639]. Some of the results have already been noticed [30, p. 65]. The method proved to be most suitable for application to early varieties, such as Bintje and Allerfrüheste Gelbe, and ineffectual for late ones like Erdgold and Ackersegen. Only unimportant differences in efficacy were observed between the several preparations (based on DNC, tar acid, and sodium arsenite) included in the tests. The effects of the treatments were improved by previously injuring or mowing down the haulms. Pulling the haulms and leaving the tubers to ripen resulted in larger yields of high-grade potatoes with a low virus incidence than chemical haulm-killing, particularly in the case of late varieties. In fact, the application of lethal sprays is regarded as a makeshift in the Swiss seed potato production industry, and the solution of the problem would appear rather to reside in the development of a mechanical method of haulm extraction.

Köhler (E.). **Der Solanum demissum-Bastard 'A 6' als Testpflanze verschiedener Mosaikviren.** [The *Solanum demissum* hybrid 'A 6' as a test plant for various mosaic viruses.]—*Züchter*, 23, 6, pp. 173–176, 15 figs., 1953.

In several years' experiments at the Virus Research Institute, Celle, Germany, a selection designated 'A 6' from the F_1 progeny of a cross between *Solanum demissum* and the Aquila potato variety has been of great value as an indicator plant for potato viruses A, X, Y, stem-mottle [*R.A.M.*, 32, p. 612], bouquet ring spot [32, p. 274], and aucuba F/G, and various strains of tobacco mosaic virus. Inoculation was effected by rubbing both leaf surfaces (previously abraded with carborundum) with crude sap from infected plants, using a technique similar to Samuel's [11, p. 334]. The test plants should be maintained in a subdued light.

Rönnebeck (W.). **Standortseinflüsse einer Abbaulage auf die Kartoffel bei Unterbindung von Virusverseuchung.** [Ecological influences of a 'degeneration' area on Potato with the elimination of virus contamination.]—*Z. PflKrankh.*, 60, 5, pp. 225–246, 14 figs., 1 diag., 1953. [English summary.]

This is an expanded, tabulated survey and discussion of the author's observations on the effect of growing the same potato clone for several successive years in a typical 'degeneration' area in Germany [cf. *R.A.M.*, 33, p. 13 and following abstracts] when virus factors are eliminated.

Schick (R.). **Fragen der Pflanzkartoffelerzeugung.** [Problems of seed Potato production.]—Reprinted from *Dtsch. Landw.*, 3, 12, 10 pp., 1 map, 1952. [Received 1953.]

Further information is presented on the progress since 1948 of work on the reorganization of the potato production industry in Eastern Germany, particularly in relation to virus diseases [see preceding and next abstracts]. All the élite and superélite varieties in five potato-producing areas have been tested each year for virus content, the percentage with 1 per cent. or less virus having risen from 12 in 1949 to 51 in 1952, and with 5 per cent. or less from 53 to 81. The virus status of the 24 varieties now being generally grown is tabulated. Aquila and Gülzow 633 head the list with 0·6 and 0·8 per cent., respectively, in 1951 and 2·2 and 2 per cent. in 1952. In trials at Gross-Lüsewitz, however, there was no correlation between percentage of virus-diseased tubers and yield. It is important, therefore, to select high-yielding, tolerant varieties, such as Nova, Johanna, and Merkur.

Schick (R.) & Jacob (E.). **Der Wiederaufbau der Kartoffelzüchtung in der DDR nach 1945.** [The reorganization of Potato-breeding in the German Democratic

Republic after 1945.]—*Züchter*, 21, 7–8, pp. 211–222, 2 graphs, 1951. [Received 1953.]

The problems involved in the reorganization of the potato-breeding industry in Eastern Germany since 1945 are explained and an interesting tabulated account is given of the methods adopted and the disease status of the varieties in the élite classes in 1949 and 1950, especially as regards virus diseases [see preceding abstracts], in the few regions suitable for production remaining after the loss in the post-war territorial transfer of 97·6 per cent. of the entire area formerly used for this purpose. In 1949 Primula and Bona were the varieties with least virus infection (under 1 per cent.), followed by Frühmölle, Cornelia, Aquila, and Robusta (over 80 per cent. with under 3 per cent.). In 1950 only Bona was in the first category, while Toni, Leona, Johanna, Flämingsstärke, Capella, Edelgard, Immertreu, and Mittelfrühe had been added to the second.

The survey showed that the position had improved in 1950 in all areas, there being a greater percentage of varieties with low virus infection and fewer with over 20 per cent.

Mention is also made of the usual tests for resistance to wart disease [*Synchytrium endobioticum*], which were supplemented by a special trial of varietal reaction to the new biotypes at Giessübel [33, p. 14 and next abstract], and to scab [*Actinomyces scabies*].

Winkelmann (A.). **Biotypen des Kartoffelkrebserregers in Westdeutschland. Weitere Fundstellen von Biotypen des Kartoffelkrebserregers in Westdeutschland.** [Biotypes of the Potato wart incitant in Western Germany. Further habitats of biotypes of the Potato wart incitant in Western Germany.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 4, 9, p. 140, 1952; 5, 11, pp. 173–175, 1953.

Exceptionally heavy outbreaks of potato wart disease (*Synchytrium endobioticum*) [*R.A.M.*, 33, p. 14 and preceding abstract] were reported to the Münster Plant Protection Station from localities in Westphalia in the summers of 1950 and 1951, affecting the Ackersegen and Bona varieties in both years with the addition of Heida in the latter. All the 57 varieties planted in 1951 in a field infested the year before contracted the disease. The identity of the strains involved has not been determined.

In the autumn of 1952 further virulent areas of infection (one extensive) were notified from three more districts of Westphalia, the Ackersegen crop, in particular, being a total failure. The several strains under observation presented close similarities in laboratory experiments during the winter of 1952–3. In field trials with three biotypes on 77 varieties only Fram, Hilla, Fortuna, and Fontana remained entirely free from attack. One of the 1952 strains produced specially large excrescences and was highly aggressive, notably to Carmen, Delta, Immertreu, Magna, and Ronda. Among the new selections submitted for testing, a few were resistant to all three biotypes, encouraging the hope of further developments along these lines.

Sharikov (K. E.). Поражение Картофеля раком при разной концентрации зооспорангиев в почве. [Infection of Potato with wart by different concentrations of zoosporangia in the soil.]—Сад и Огород [*Orchard & Garden*], *1953*, 8, pp. 60–61, 1953.

In studies in the U.S.S.R. on the development of potato varieties resistant to wart [*Synchytrium endobioticum*: *R.A.M.*, 32, p. 448 and following abstracts] experiments were carried out in 1950–1 to determine the level of soil infestation at which susceptible varieties become completely infected with wart. Using a

range of zoosporangial concentrations it was found that even 25 zoosporangia per gm. of soil were able to infect 60 per cent. of the plants while one sporangium in 10 gm. soil infected single plants. These results indicate that even insignificant soil infestations can serve as infection sources.

Pushkarev (I. I.). Мероприятия по борьбе с Картофельным раком. [Control measures against Potato wart.]—Сад и Огород [*Orchard & Garden*], *1953*, 9, pp. 53–55, 1953.

The success of quarantine measures in checking the spread of potato wart [*Synchytrium endobioticum*] in the U.S.S.R. [see preceding and next abstracts] depends largely on timely detection of the disease and the cultivation of resistant varieties. The measures should apply without exception to all districts where spread is likely; potatoes and other solanaceous plants should not be planted in infested soil. Thorough soil disinfection is recommended, chloropicrin giving the best results; slight primary infections should be treated immediately on detection, under the guidance of the quarantine inspection officer, with a 5 per cent. solution of caustic soda or concentrated lye, both at 15 l. per sq. m. [cf. *R.A.M.*, 32, p. 448].

Dorozhkin (N. A.). Агротехнические способы борьбы с раком Картофеля. [Agricultural methods of controlling Potato wart.]—Докл. Акад. сельскохоз. Наук Ленина [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad. agric. Sci.*], 18, 7, pp. 3–6, 1953.

Studies on the control of potato wart [*Synchytrium endobioticum*] at the U.S.S.R. Academy of Sciences [see preceding abstracts] have shown that seed tubers produced in the summer have higher wart resistance, 20th to 25th June being the most suitable period for summer planting. Leaving the field fallow encouraged the growth and eventually the death of winter zoosporangia by creating temperature and air conditions favourable to their development.

Hyre (R. A.). **Potato wart eradication project in Pennsylvania.**—*Plant Dis. Reptr*, 37, 9, pp. 453–454, 1953. [Multilithed.]

The 'total destruction' procedure used in the eradication of potato wart (*Synchytrium endobioticum*) by the Pennsylvania Department of Agriculture [*R.A.M.*, 30, p. 625], which was successful in limited tests, consists in keeping the land clean and cultivating it frequently for the first two years, applying copper sulphate the first and an equal amount of lime the second, growing several varieties of vegetables the third year, and potatoes the fourth.

A tabulated summary, compiled by R. E. Hartman, is given of the progress made since 1952 and plans for the future.

Keay (Margaret A.). **Delayed sporulation of Phytophthora infestans on infected Potato shoots.**—*Plant Path.*, 2, 2, pp. 68–70, 1953.

Experimental evidence is presented from the Potato Genetics Station, Cambridge, demonstrating that *Phytophthora infestans* is able to grow for months within the developing tissues of the potato plant without sporulating and showing that it does not form spores until the environmental conditions have become suitable [cf. above, p. 169].

Benlloch (M.). **Un método de laboratorio para el ensayo de anticriptogámicos contra el 'mildiu' de la Patata.** [A laboratory method for the assay of fungicides against Potato blight.]—*Bol. Pat. veg. Ent. agríc., Madr.*, 17 (*1949*), pp. 15–18, 1 fig., 1950.

The following method was evolved in the laboratory of the Agricultural Phyto-

pathology Station, Madrid, for the assay of fungicides against *Phytophthora infestans* [*R.A.M.*, 32, p. 445 and next abstract]. Healthy tuber slices were treated with the test fungicide, atomized with a spore suspension of the fungus grown on tuber slices, and incubated under moist conditions together with a slice not treated with fungicide. An ideal method is to use a large dish containing three slices, two treated with different fungicides and the third as a control.

HELLQUIST (H.). **Besprutningstekniska försök mot Potatisbladmögel (Phytophthora infestans (Mont.) De By). I. Laboratorieförsök med bordåbehandling av Potatisblad.** [Spraying technique experiments against Potato blight (*Phytophthora infestans* (Mont.) De By). I. Laboratory experiments on the Bordeaux treatment of Potato leaves.]—*K. LandtbrAkad. Handl., Stockh.*, 92, 2–3, pp. 194–212, 7 figs., 2 diags., 1 graph, 1953. [English summary.]

At the Royal Agricultural College, Uppsala, Sweden, Bintje potato leaves were sprayed in different ways with Bordeaux mixture, inoculated with zoospores of *Phytophthora infestans* [*R.A.M.*, 32, p. 11 and next abstract], and then transferred to Petri dishes containing moistened filter paper. A few days later the infected area was graded according to Horsfall and Barratt's scale [25, p. 39]. It was found that application of the fungicide at 2 per cent. exclusively to the upper surface of the leaf did not prevent infection when both surfaces were inoculated, while treatment of the lower side was somewhat more effective [cf. 32, p. 447]. Far superior results, however, were given by spraying both surfaces at a strength of 1 per cent.

HOFSTEN (C. G. v.). **Bladmögelbekämpning och produktion av kvalitetspotatis.** [Leaf blight control and production of high-grade Potatoes.]—*Försök o. Forskn.*, 10, 7, pp. 54–55, 1 graph, 1953.

Practical information, based on experiments at the Plant Protection Institute, Stockholm, is briefly summarized on the control of potato blight [*Phytophthora infestans*: see preceding abstract], the most devastating disease of the crop in Sweden. A table is given showing the copper contents of the 13 liquids and three dusts tested and the rates of application to give a minimum dosage of 3 kg. copper per ha. for each. Properly blended, home-made Bordeaux mixture (25 per cent. copper) is superior in tenacity to commercial preparations and costs only Kr. 30 (exclusive of labour for making up) as against 35 to 60 per ha. for the other preparations. Cuzol M [cf. *R.A.M.*, 28, p. 191], containing 12·5 per cent. copper and 8 to 10 per cent. manganese sulphate, is particularly useful in manganese-deficient soils [33, p. 49].

In general, a high working pressure, e.g., 15 to 20 kg. per sq. cm., and the use of very finely divided fungicides reduce consumption as compared with low pressure and coarse particles, but the amount delivered per ha. should not fall below 600 l. Complete coverage of the leaves is essential. The first application may be deferred until flowering time [cf. 32, p. 584], though a considerably earlier treatment is sometimes needed for very susceptible varieties. A further two or three sprays (four or five for very susceptible varieties and in wet weather) should be given at two- to three-weekly intervals.

Reckoning the costs of the fungicide at Kr. 35, labour at Kr. 25, and subsequent chemical haulm-killing at Kr. 75, the expenditure for two treatments would be Kr. 195 and for three Kr. 255 per ha. In an epiphytotic season, however, the profits on increased yields may exceed the cost of spraying five- to tenfold. Even a 20 per cent. reduction in the harvest entails a loss of Kr. 400 to 800 per ha., which may be further augmented by the development of rot in storage and the additional expenses of grading. Thus, the outlay on a rational blight control programme may be regarded as a reasonable and well-spent insurance premium.

Casseres (E. H.), Peterson (L. C.), & Reddick (D.). **Tres nuevas variedades de Papas resistentes al tizón tardío.** [Three new Potato varieties resistant to late blight.]—*Turrialba*, 3, 3, pp. 86–90, 4 figs., 1953. [English summary.]

The new potato varieties Ticanel (Cornell clone EVI–2), Rosanel (CZK–7), and Güetar (DUA–2) were selected by the Inter-American Institute of Agricultural Sciences from material developed by Cornell University in a co-operative programme begun in 1946. Studies and trials conducted in the Meseta Central, Costa Rica, on volcanic soils at altitudes of 1,400 to 2,800 m. and mean temperatures of 13° to 20° C. demonstrated their superior yields and resistance derived from *Solanum demissum* [*R.A.M.*, 32, p. 208; 33, p. 47] to the common race A of *Phytophthora infestans* [C.M.I. map No. 109]. They are, however, susceptible to race D [*R.A.M.*, 32, p. 501]. Commercial production of 'seed' of these varieties has begun.

Harford [29, p. 430], originally selected for New York State, has proved highly satisfactory in Costa Rica. It is similar to the new varieties in blight resistance and yield.

Mishra (J. N.). **Resistance of Potato tubers to certain parasitic fungi.**—*Phytopathology*, 43, 6, pp. 338–340, 1953.

Studies at the Imperial College of Science and Technology, London, on the parasitization of potato tissue by *Pythium debaryanum* and *Botrytis cinerea* [*R.A.M.*, 31, p. 320] are described. The former species tends to attack soft and meristematic tissue, and the results of the present investigation, directed mainly towards the chemical aspect of invasion, support the conclusions of Hawkins and Harvey (*J. agric. Res.*, 18, pp. 275–297, 1919) and Abdel-Salam [*R.A.M.*, 13, p. 559] that the mode of attack is mechanical. Pectic enzymes do not appear to be produced in any appreciable quantity by the fungus in potato tissue itself, though they develop after an incubation period of 10 days at 20° C. in synthetic medium based on the composition of the potato tuber tissue, with 1 gm. starch added and diluted 12 times before use. Introduced into a water-injected tuber [31, p. 320], *P. debaryanum* remains inactive, whereas injection of its pectic enzyme incites heavy rotting. Immature tubers of the Majestic variety were more susceptible than mature ones, and there was a high negative correlation ($r = -0{\cdot}3482$) between the normal water content and the incidence of decay caused by the pathogen.

Unlike *P. debaryanum*, *B. cinerea* does not normally attack the potato, and although it produced pectic enzymes in the tissue their diffusion was greatly restricted. Introduced into a water-injected tuber, the fungus rapidly causes extensive rotting, especially of immature potatoes. It would appear from the available evidence that an enzymatic process is involved in the parasitization of plant tissue by *B. cinerea*.

Dillon Weston (W. A. R.). **Injury to Potato tubers by ants.**—*Plant Path.*, 2, 2, pp. 55–56, 1 pl., 1953.

The author presents evidence that ants are responsible for damage to potato tubers in Great Britain closely resembling pit rot described by Pethybridge in 1919; deleterious vapours or liquids may, however, induce similar injuries.

Friedman (B. A.) & Folsom (D.). **Potato tuber glassy-end and jelly-end rot in the northeast in 1949 and 1952.**—*Plant Dis. Reptr*, 37, 9, pp. 455–459, 4 figs., 1953. [Multilithed.]

Potato tuber jelly-end was classified by Blodgett and Rich [*R.A.M.*, 29, p. 113] as a non-parasitic disease, characterized by a jelly-like mass of tissue extending for an inch or more from the stem end of the tuber, which either shrivels and dries, leaving a clear-cut division, or is followed by a *Fusarium* rot. The disease is most

common on long, narrow, or pointed tubers and is general over the Pacific Northwest. Glassy end [15, p. 821] was observed in Maine for the first time in 1949. Among the isolates obtained from the glassy, starch-free tuber tissue were *Colletotrichum atramentarium*, species of *Nigrospora*, *Penicillium*, and *Trichoderma*, *Verticillium albo-atrum*, and some unidentified bacteria. *V. albo-atrum*, *Alternaria tenuis*, *Phoma tuberosa*, and some bacteria were isolated from the dark broken-down tissue replacing the glassy one. In the same year tubers affected by jelly- or glassy-end and jelly-end rot [loc. cit.] were received from Long Island, New York, and New Jersey. Glassy-end tissue was usually sterile, while species of *Rhizoctonia* and *Fusarium* and several types of bacteria were isolated from the jelly-end rots. None of these organisms, however, reproduced the disease symptoms in inoculation experiments. In 1952 tubers were again affected in the same two areas and also in Pennsylvania. During both years the growing seasons were characterized by hot, dry weather followed by ample rainfall.

Tomizawa (C.). **Studies on the nutritional physiology of the Rice blast fungus (Piricularia oryzae).**—*Ann. phytopath. Soc. Japan*, 17, pp. 113–118, 1953. [Japanese, with English summary.]

Pyrimidine and thiazole were shown to be essential for the growth in liquid culture of *Piricularia oryzae* [*R.A.M.*, 33, p. 112], which synthesizes them into thiamine. The minimum requirement of biotin was about 0·004 μgm. and of thiamine hydrochloride 0·2 μgm. in 10 ml. culture solution. Sugars were better sources of carbon than the higher alcohols. In different media containing equivalent amounts of nitrogen, the growth of the fungus was most profuse on ammonium sulphate and least so on sodium nitrate, sodium glutamate and asparagine being intermediate. Among the amino acid components of rice leaves, aspartic and glutamic acids were the most stimulatory, while neither tyrosine nor phenylalanine was utilized. The growth of *P. oryzae* was promoted to some extent by the addition of certain organic acids, especially their ammonium salts.

Some 50 isolates of the pathogen differed scarcely at all in their nutritional requirements, but a mutant needing adenine as well as biotin and thiamine developed under the influence of ultra-violet irradiation.

Van Heusden (W. C.). **De Zuid-Amerikaanse bladziekte (Dothidella ulei), een brandende kwestie.** [The South American leaf disease (*Dothidella ulei*), a burning question.]—*Bergcultures*, 22, 9, pp. 171–177, 1953. [English and Indonesian summaries.]

The protective measures adopted of recent years in south-east Asia to prevent the entry of South American leaf disease (*Dothidella ulei*) of *Hevea* rubber [*R.A.M.*, 33, p. 113 and following abstracts] fall into three categories, based on (*a*) preventing the introduction of the pathogen into the area, (*b*) recognition of the disease and measures for its control, and (*c*) breeding for resistance. The practicability of these steps as a short- and long-term policy is discussed, with special reference to international co-operation. Progress in defence against the disease is not yet as far advanced in Indonesia as in Malaya and requires to be expedited by means of propaganda and the establishment of a control organization, while the work of selection for resistance must be energetically pursued.

Langford (M. H.) & Echeverri (H.). **Control of South American leaf blight by use of a new fungicide.**—*Turrialba*, 3, 3, pp. 102–105, 2 figs., 1953. [Spanish summary.]

Experiments on the control of South American leaf blight of rubber (*Dothidella*

ulei) [see preceding and next abstracts] conducted from 1950 to 1951 in the Goodyear Rubber Plantations, Cairo, Costa Rica [*R.A.M.*, 31, p. 375], demonstrated that dithane Z–78 (1½–100) applied every eight days gave better control than the standard 'insoluble' copper applied every four days. Parzate (1½–100) at five-day intervals also gave excellent control, reducing infection to less than 1 per cent. Both fungicides, which were also responsible for the production of larger leaves and more vigorous growth than the copper sprays, have since been employed successfully in several other parts of the American tropics where they also gave efficient control of target leaf spot (*Pellicularia filamentosa*) [*Corticium solani*: 31, p. 294].

Tysdal (H. M.) & Rands (R. D.). **Breeding for disease resistance and higher Rubber yield in Hevea, Guayule, and Kok-Saghyz.**—*Agron. J.*, 45, 6, pp. 234–243, 6 figs., 2 graphs, 1953.

According to the defence authorities of the United States, some 25 per cent. of the total rubber requirements of the country must still consist, especially in an emergency, of plantation rubber (*Hevea brasiliensis*), notwithstanding immense improvements in synthetic substitutes. Since 1940, therefore, the Department of Agriculture has been co-operating with 11 Latin-American Republics in the production of a disease-resistant, high-yielding tree to form the basis of a self-supporting industry in these areas, and an account is given of the progress to date in the development of selections from crosses between *H. brasiliensis* and *H. benthamiana*, the most promising in respect of resistance to *Dothidella ulei* [see preceding abstracts].

Of major importance in the breeding of guayule (*Parthenium argentatum*), especially for cultivation in Texas, is the development of resistance to charcoal rot (*Sclerotium bataticola*) [*Macrophomina phaseoli*: *R.A.M.*, 26, p. 168], southern blight (*S. rolfsii*), and Texas root rot (*Phymatotrichum omnivorum*) [loc. cit.]. Some of the new hybrids appear to be resistant to charcoal rot, which has been the most serious disease of late years on the formerly standard variety 953.

Vergnano (Ornella). **L'azione fisiologica del nichel sulle piante di un terreno serpentinoso. Effetti di alte concentrazioni di nichel su alcune piante da cultura.** [The physiological action of nickel on plants from a serpentine soil. The effects of high concentrations of nickel on some cultivated plants.]—*Nuovo G. bot. ital.*, N.S., 60, 1–2, pp. 109–183; 189–196, 8 pl., 1 fig., 1953. [English summaries.]

The information contained in these papers describing studies on crops in a serpentine area at Whitecairns, Aberdeenshire [*R.A.M.*, 32, p. 427], has already been noticed from other sources [loc. cit.; 31, p. 631].

Micev (N.) & Micovski (M.). Микробиолошко испитување на црвениците во Скопско. [Microbiological examination of red soils round Skoplje.]—*Annu. (Fac. Agron. Silvic.) Agron. Skoplje*, 3 (*1949–50*), pp. 65–82, 1953. [English summary.]

Six samples of cultivated and uncultivated red soil (pH 6·8) from around Skoplje, Yugoslavia, were examined by the direct microscopic method, using smears of soil stained with carbol erythrosin for four minutes over a boiling water bath, and the agar plate method [cf. *R.A.M.*, 32, pp. 590, 643]. The media recommended by A. Cunningham (Practical Bacteriology, third edition, London, 1947) was used for plating. The total number of microorganisms detected (in millions per gm. soil) ranged from 248 to 1,470 by the direct method and 2,810 to 42,650 by plating. Bacteria were the most numerous, followed by actinomycetes. Fungi, ranging from 60,000 to 1,630,000 per gm. soil, formed about 1 to 3·8 per cent. of the total red soil microflora investigated.

HEWITT (E. J.). **Experimental methods for the study of micronutrient deficiencies in plants grown in sand culture.**—*Rep. agric. hort. Res. Sta. Bristol, 1952*, pp. 193–195, 1 pl., 1952.

A summary is given of the minimum requirements recommended for reproducible production of severe deficiency status in sand culture for each of the known plant micro-nutrients [cf. *R.A.M.*, 32, pp. 29, 600]. The materials and their preparation are discussed under five headings, namely, containers, sand, water, nutrient reagents, and management. The method has been used successfully for the production of severe deficiencies in about 40 crop plants.

FORSTER (W. A.). **Some effects of metals in excess on crop plants grown in soil culture : V. Effects of copper on the mineral status of Oat, Rye, Barley, Sugar Beet and Kale. VI. Effects of cobalt and copper on mineral status of Oat.**—*Rep. agric. hort. Res. Sta. Bristol, 1952*, pp. 204–218, 48 graphs, 1952.

In pot experiments at Long Ashton Research Station with copper sulphate at various concentrations copper application [*R.A.M.*, 33, p. 102] decreased the dry weight and potassium oxide and phosphoric oxide contents and increased the copper, manganese, calcium oxide, and magnesium oxide content of oats, rye, barley, sugar beet, and kale.

Copper and cobalt treatments decreased the dry weights of oat tops and produced iron deficiency symptoms in leaves and a reduction in the total iron status.

MOLLISON (JANET E.). **Effect of partial sterilization and acidification of soil on the fungal population.**—*Trans. Brit. mycol. Soc.*, 36, 3, pp. 215–228, 1 pl., 1 diag., 2 graphs, 1953.

The effects of steam, 10 per cent. formalin (1 gal. per sq. yd.), and 3 per cent. sulphuric acid on the fungus population of an old forest nursery soil over Lower Greensand at Ampthill, Bedfordshire [*R.A.M.*, 32, pp. 108, 398], were studied at Rothamsted Experiment Station in two experiments from 1949 to 1951. Sitka spruce was sown three weeks after treatment. Samples were taken from the different plots at intervals for 25 months, the fungus numbers per gm. of soil being estimated on dilution plates. Steaming almost completely eliminated the fungi and at the end of the experiment the numbers were only about half those of the controls; the recolonizing fungi appeared slowly and were extremely varied. Formalin also reduced the numbers but the recolonizers developed rapidly and were dominated by *Trichoderma* spp. Acid treatment increased the numbers slightly. The second experiment, in which acidification was omitted and nitro-chalk added to half the plots in each treatment, gave similar results.

Preliminary experiments indicated that *Trichoderma* tolerated formalin [cf. 32, p. 497] at 0·1, 0·05, and 0·01 per cent., while *Cladosporium* and *Mortierella* failed to grow at 0·05 per cent.; on the tenth day growth of *Cephalosporium*, *Mortierella*, *Mucor*, *Paecilomyces*, and *Phoma* had ceased on the 0·1 per cent. plates. The growth of one strain of *Trichoderma* on plain agar was appreciably more at the end of 18 days with 0·02 and 0·04 per cent. formalin than with no formalin or up to 0·1 per cent.

NUTMAN (F. J.) & ROBERTS (F[LORENCE] M.). **Two new species of fungi on Clove trees in the Zanzibar Protectorate.**—*Trans. Brit. mycol. Soc.*, 36, 3, pp. 229–234, 1 pl., 4 figs., 1953.

The information relating to *Cryptosporella eugeniae* on clove trees in Zanzibar has already been noticed from another source [*R.A.M.*, 32, p. 508]. The fungus was found twice on *Eugenia jambosa*.

Valsa eugeniae n.sp., the agent of sudden death [32, p. 278] of mature trees, is

characterized by black, spherical or laterally compressed perithecia 200 to 280 (average 240) μ in diameter with necks 600 to 900 (780) μ long and 50 to 60 (56) μ in diameter with a rounded apex. The sessile, non-paraphysate, subclavate asci, rounded at both ends, measure 17 to 26 (21) by 4 to 6 (4·7) μ; the hyaline, unicellular, allantoid ascospores measure 4 to 5 (4·3) by 1 to 1·5 (1·3) μ. The black, unilocular (on natural substrata, multilocular in culture), internally hyaline pycnidia, flattened at the base, are 200 to 300 (250) μ in diameter and 28 to 500 (340) μ high; the unicellular, allantoid pycnidiospores, 2 to 4 (3·4) by 0·5 to 1 (0·8) μ, are extruded to form slimy yellow globules; and the hyaline, branched conidiophores measure 10 to 42 (19) μ long and 1 to 1·5 μ wide at the base.

The fungus is constantly associated with trees that have died from the sudden death disease and also occurs as a rather weak wound parasite of the branches. A brilliant, saffron-yellow, water-soluble stain is found in the affected wood, separated from the healthy by a narrow, bluish-grey zone often limited by a sharp black line. Perithecia appear first at the collars of standing trees and are found in large quantities all over the surface of the trunk and larger branches and on the exposed wood of felled tree stumps. Pycnidia are abundant on exposed wood surfaces only in moist conditions.

Nutman (F. J.) & Roberts (F[lorence] M.). **Investigations into diseases of the Clove tree in Zanzibar.**—*E. Afr. agric. J.*, 18, 4, pp. 146–154, 1953.

The authors present a critical review of investigations carried out since 1922 in Zanzibar into die-back (*Cryptosporella* [*eugeniae*: see preceding abstract]) and sudden death of cloves (*Valsa* [*eugeniae*: loc. cit.]).

Keyworth (W. G.). **Verticillium wilt of the Hop. VI. The relative roles of root and stem in the determination of wilt severity.**—*Ann. appl. Biol.*, 40, 2, pp. 344–361, 1 pl., 1953.

This is an amplified account of work at East Malling Research Station on hop wilt (*Verticillium albo-atrum*) already noticed from another source [*R.A.M.*, 32, p. 399].

Hunt (O. J.). **Determination of sample size for evaluating resistance to downy mildew in Hops.**—*Agron. J.*, 45, 9, pp. 406–408, 1953.

At Oregon Agricultural Experiment Station an investigation was conducted on 21 varieties or strains of hops to determine the effect of the size and distribution of samples on the efficiency of a method of assessing resistance to downy mildew (*Pseudoperonospora humuli*) [cf. *R.A.M.*, 21, p. 391; 32, p. 277]. The three variables introduced into the sampling error, viz., leaves, suckers, and plants, were compared by analysis of variance, the results of which showed that efficiency is enhanced much more rapidly by increasing the number of plants sampled per plot, while taking correspondingly fewer suckers per plant, than by multiplying the number of leaves per sucker. However, should the number of plants of a given variety or line be limited, it would be advantageous to take more suckers per plant and the fewest possible leaves per side arm.

Milatović (Ivanka). **Prilog poznavanju gljive Pleospora calvescens (Fr.) Tulasne na Maku.** [Contribution to the knowledge of the fungus *Pleospora calvescens* (Fr.) Tulasne on Poppy.]—*Rev. Sci. agric., Zagreb, 1952*, 13, pp. 121–133, 8 figs., 1952. [English summary.]

Severe attacks by *Pleospora calvescens* have occurred on cultivated opium poppy (*Papaver somniferum*) [cf. *R.A.M.*, 25, p. 418] in various parts of Yugoslavia since 1946. The disease was first recorded in Macedonia in 1922. In studies at the Phyto-

pathological Institute of the Faculty of Agricultural Forestry, Zagreb, opium poppies were successfully infected with ascospores and conidia of the fungus. The conidial state was found in nature on *P. rhoeas* to which isolates from opium poppy proved pathogenic.

CALVERT (O. H.), THOMAS (C. A.), & VAN HORN (D. L.). **A bacterial leaf spot disease of Castorbean new for the United States.**—*Plant Dis. Reptr*, 37, 9, pp. 477–478, 1 fig., 1953. [Multilithed.]

Bacterial leaf spot of *Ricinus communis* caused by *Xanthomonas ricinicola* [cf. *R.A.M.*, 30, p. 542] was observed in commercial fields in Oklahoma and Texas in 1950, 1951, and 1952 and in varietal yield test plots in Maryland and Texas in 1952. The disease is believed to be widespread throughout the castor oil producing areas of the southern Great Plains, though its effect so far is not serious. In greenhouse inoculation experiments young plants were more severely damaged than older ones, Nebraska 145–4 being the most susceptible variety tested and Cimarron the most resistant. Field observations indicated that the bacterium is seed-borne and is spread chiefly by wind-blown rain. No variety was completely field immune, Cimarron again being the least affected, while Anjou, Baker 195, Illinois 48–36, and Western Oil Hybrid 9 appeared to be somewhat resistant.

CRANDALL (B. S.) & DIÉGUEZ C. (J.). **Pyrethrum collar rot in Peru.**—*Plant Dis. Reptr*, 37, 9, p. 482, 1953. [Multilithed.]

Chrysanthemum cinerariifolium plants grown at 2,200 ft. in the Tingo María area, Peru, were all killed by a root and collar rot caused by *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 28, p. 642]. Another collar rot, first observed in 1937 in the highlands (13,000 ft.) at Concepción, near Huancayo, was found in 1946 to be due to a strain of *Phytophthora cactorum*.

BRUEHL (G. W.). **Strains of Sugarcane mosaic in Puerto Rico.**—*Plant Dis. Reptr*, 37, 9, pp. 479–481, 1953. [Multilithed.]

A survey of the strains of sugar-cane mosaic virus present in Puerto Rico [*R.A.M.*, 32, p. 644] was carried out conjointly by the Division of Sugar Plant Investigations and the Puerto Rico Agricultural Experiment Station. In greenhouse screening tests, using the differential varieties C.P.31–294 and C.P.29–291, some of the collections of the virus, from different areas and from five varieties, caused symptoms resembling those of strains A, B, C, and D [32, p. 212], while others produced a milder pattern than is typical of strain A. Strain B was predominant in the field, but strain A was more infective to the five varieties used in pin-prick inoculation tests and had a shorter incubation period. Strains C and D were the least infective except on the variety B.37161.

SHARMA (S. L.). **Co. 560 and Co. 561 : Sugarcane or Sorghum?**—*Curr. Sci.*, 22, 8, pp. 242–243, 2 figs., 1953.

The author considers that to refer the record of *Sphacelotheca* [*cruenta*] on Co. 560 and Co. 561 in India to sugar-cane [cf. *R.A.M.*, 31, p. 400] is misleading since these varieties are sorghum-sugar-cane hybrids with few sugar-cane features. The smut has not been recorded yet on pure sugar-cane varieties.

DIAS (MARIA R. DE S.), LUCAS (MARIA T.), DE VASCONCELOS (A. T.), & DA CAMARA (E. DE S.). **Minutissimum mycoflorae subsidium Sancti Thomensis et Principis Insulae.** [A very small contribution to the mycoflora of São Tomé and Principe Islands.]—*Agron. lusit.*, 15, 1, pp. 5–15, 1 pl., 1953.

Among the 30 species recorded in this list of fungi collected in 1951 on São Tomé

and Principe Islands [Gulf of Guinea, West Africa] may be mentioned *Didymosphaeria oliveirana* n.sp., characterized by more or less orbicular, brownish perithecia, 130 to 150 by 120 to 130 μ, clavoid, pedicellate, hyaline asci, 52 to 65 by 9·5 to 10 μ, and somewhat fusoid, straight or curved, smoke-coloured ascospores, 15·5 to 17 by 3 to 4·5 μ, on leaves of *Artocarpus communis* in São Tomé; *Stachylidium* [*Verticillium*] *theobromae* on fruits of *Musa ensete* [Abyssinian banana: C.M.I. map No. 146]; and *Acrostalagmus cinnabarinus* [*Nectria inventa*: *R.A.M.*, 28, p. 490] on cacao wood.

Da Costa (Maria E. A. P.) & Da Camara (E. De S.). **Species aliquae mycologicae Lusitaniae II.** [Some Portuguese mycological species II.]—*Portug. Acta biol.*, 4, 1–2, pp. 162–176, 12 figs., 1953.

Among the 54 records in this further contribution to the mycoflora of Portugal [*R.A.M.*, 32, p. 511 and cf. next abstracts] may be mentioned *Uromyces caryophyllinus* [*U. dianthi*] and *Septoria dianthi* [cf. 24, p. 475] on carnation; *Puccinia asparagi* [C.M.I. map No. 216] in association with *Fusarium* (?) *delacroixii* and *Pleospora herbarum* [*R.A.M.*, 20, p. 307] on asparagus; *Puccinia buxi* [24, p. 475] and *Phomopsis stictica* [*Diaporthe retecta*: 13, p. 738] on box; *Sphaerella* [*Mycosphaerella*] *oryzae* [cf. 29, p. 530] in conjunction with *Piricularia oryzae* [32, p. 512] on rice; *Peronospora brassicae* [*P. parasitica*] on cabbage; *Cytospora salicis* on *Salix babylonica* [cf. 26, p. 130]; *Dothiorella mali* [cf. 5, p. 279] together with *Botryosphaeria berengeriana* [cf. 21, p. 274] on apple; *Phomopsis* [*Diaporthe*] *citri* [C.M.I. map No. 126] and *Coniothyrium fusco-atrum* on lemon; *Colletotrichum gloeosporioides* on orange [cf. *R.A.M.*, 21, p. 404]; *Marssonina juglandis* [*Gnomonia leptostyla*] on walnut [cf. 28, p. 315]; *Botrytis parasitica* [*B. tulipae*: 31, p. 479] on gladiolus; and *F. moniliforme* [*Gibberella fujikuroi*] on maize [C.M.I. map No. 102].

There are six new species. The pycnidia of *Dothiorella brassicae* n.sp., associated with *Botryosphaeria* (?) *berengeriana*, *Pleospora herbarum*, and *Phomopsis cruciferae* on cabbage, are more or less orbicular, blackish-brown, and up to 250 μ in diameter, and the clavoid or ellipsoid spores measure 16 to 24 by 5 to 8 μ.

C. dahliae n.sp., collected on dahlia and chrysanthemum, is characterized by disciform, yellow acervuli, 130 to 195 by 50 to 60 μ; black to fuliginous setae, often septate at the base, 47 to 78 by 3·75 to 4·5 μ; and oblong or somewhat cyclindrical, mostly straight conidia, 16 to 19 by 5·3 to 7 μ.

Pestalozzia pitospora n.sp., occurring in conjunction with *Phoma viticola* [*R.A.M.*, 12, p. 395] and *Phomopsis viticola* [32, p. 592] on vine, produces roughly triangular, fuscous acervuli, 342 to 365 by 114 to 170 μ; pale yellow, filiform conidiophores, 19 to 39 by 2 to 2·5 μ; barrel-shaped, four-celled conidia, 16 to 23 by 7 to 11 μ, the pedicel measuring 11 by 1·5 μ, and three curved, apical, hyaline appendages, 13 to 15·5 by 0·8 μ.

Dias (Maria R. De S.) & Da Camara (E. De S.). **Fungi Lusitaniae IV.** [Fungi of Portugal IV.]—*Agron. lusit.*, 15, 1, pp. 17–37, 1 pl., 1953.

Included in this further contribution to the knowledge of Portuguese fungi [cf. *R.A.M.*, 33, p. 52 and preceding and next abstracts] are *Peronospora parasitica* on *Coronopus squamatus* [cf. 29, p. 279], *Phyllosticta ulmicola* causing leaf spot of elm (*Ulmus campestris*), *Septoria aesculina* on horse-chestnut [cf. 26, p. 329], *S. osteospora* associated with *Melampsora larici-populina* on poplar, *Colletotrichum rubi* n.sp. producing whitish lesions on raspberry branches, and *Gloeosporium fructigenum* [*Glomerella cingulata*] on apple fruits.

C. rubi is characterized by subconical, innate-erumpent, fuscous-brown acervuli, 180 to 255 by 60 to 70 μ, bordered by fuliginous setae, 51 to 82·5 by 2·5 to 4 μ; filiform, hyaline conidiophores, 8 by 1·3 μ; and more or less cylindrical or clavoid,

straight, mostly bi- to triguttulate, continuous, hyaline conidia, 15 to 17·5 by 4·5 to 6 μ.

Lucas (Maria T.) & Da Camara (E. De S.). **Fungi Lusitaniae V.** [Fungi of Portugal V.]—*Agron. lusit.*, 15, 2, pp. 153–180, 2 pl., 1953.

This further instalment of the current list of Portuguese fungi [see preceding abstracts] comprises four new species and a number of new records for the country, including *Phomopsis viciae* and *Septoria viciae* on vetch and *S. ocellata* on cork oak (*Quercus suber*).

Stehlé (H.). **Le Vanillier et sa culture. III. Maladies, insectes, et affections diverses du Vanillier.** [The Vanilla plant and its cultivation. III. Diseases, insects, and various disorders of the Vanilla plant.]—*Fruits d'outre mer*, 7, 6, pp. 253–260, 4 figs., 1952.

In Madagascar the most important disease of vanilla plants is root rot caused, probably, by a species of *Fusarium* which has not yet been identified [cf. *R.A.M.*, 13, p. 58; 28, p. 118; 32, p. 367]. Three forms of attack of the stem are present, 'black disease',' Mahanoro disease', and brown lesions on the lianas. In black disease the stems are at first pale yellow; they turn black later and bear a fungus [unspecified] with abundant fructifications. Rotting becomes general and the plant dies. Affected plants should be pulled up and burnt. Mahanoro disease is much more serious, but more localized. It has destroyed thousands of plants at Mahanoro. The brown lesions appearing on the lianas range in size from a pin's head to a pea, or even take the form of a brownish furrow in which the epidermis is wrinkled and quickly blackens. From the nodes the lesions spread to the internodes, and the affected area dies. The small lesions often become cicatrized, but the corrugations assume a chocolate hue and induce the death of the tree.

Mildew appears to be caused by *Phytophthora 'jatrophae'* [13, p. 58].

The control of fungal diseases, especially root rot, depends on proper cultural conditions and the planting of resistant varieties. A bibliography of 94 titles is appended.

Viennot-Bourgin (G.). **Notes mycologiques (II).** [Mycological notes (II).]—*Rev. Path. vég.*, 31, 3, pp. 185–194, 2 figs., 1952.

In these notes [*R.A.M.*, 31, p. 209] on Ustilaginales in France it is stated that the leaf smut of *Bromus erectus* in France and Switzerland is *Tuburcinia* [*Urocystis*] *macrospora*, which is distinct from *T.* [*U.*] *agropyri* [cf. 31, p. 147]. *T.* [*U.*] *bromi* is considered to be the same as *T.* [*U.*] *macrospora*.

Urban (Z.). **Příspěvek ke rzím východních Čech.** [Contribution to the rusts of eastern Czechoslovakia.]—*Preslia* (formerly *Studia bot. čechosl.*), 24, 1, pp. 45–54, 2 figs., 1952. [Russian and German summaries.]

This short contribution to the study of the Uredinales of the Pardubice region, Czechoslovakia, deals in particular with rusts occurring on grasses [cf. *R.A.M.*, 32, p. 384].

Cash (E. K.). **A check list of Alaskan fungi.**—*Plant Dis. Reptr, Suppl.* 219, 70 pp., 1953. [Multilithed.]

This list of fungi contains all the available references to species reported from Alaska [cf. *R.A.M.*, 31, p. 401 and next abstract] and records from herbarium specimens, obtained for the most part from the Mycological Collections at Beltsville, Maryland. The list is arranged systematically and there is a host index and a bibliography of 73 titles.

Anderson (J. P.). **The Uredinales of Alaska and adjacent parts of Canada.**—*Iowa St. Coll. J. Sci.*, 26, 4, pp. 507–526, 1952.

This taxonomic list of Uredinales occurring in Alaska [*R.A.M.*, 19, p. 567 and preceding abstract] and adjacent parts of Canada is based mainly on specimens collected by the author and now deposited in his herbarium at Iowa State College, Ames. It includes *Melampsorella cerastii* [26, p. 565; 28, p. 201] with aecidia on spruce (*Picea glauca*, *P. mariana*, and *P. sitchensis*) and uredo- and teleutosori on *Cerastium arvense*, *C. beeringianum*, and *Stellaria longipes*; *Melampsora lini* [C.M.I. map No. 68] on *Linum perenne*; *Puccinia coronata* on *Shepherdia canadensis* [*R.A.M.*, 26, p. 565] (aecidia) and *Deschampsia caespitosa* (uredo- and teleutosori); *Puccinia menthae* [C.M.I. map No. 211] on *Monarda mollis* [cf. *R.A.M.*, 31, p. 351] in Yukon; *P. poarum* [30, pp. 274, 602] on *Petasites frigidus*, *P. hyperboreus*, and *P. sagittatus*; *Puccinia poae-sudeticae* on *Poa pratensis* [26, p. 493]; *Uromyces caryophyllinus* [*U. dianthi*] on carnation [26, p. 347], and *U. fabae* [C.M.I. map No. 200] on *Lathyrus maritimus*.

Katsuki (S.). **Notes on parasitic fungi of Yaku-Island.**—*J. Jap. Bot.*, 28, 9, pp. 279–288, 5 figs., 1953.

This is an annotated list of 47 parasitic fungi found in 1952 and 1953 on Yaku Island, Japan [*R.A.M.*, 32, p. 697], including six new species and several new records for Japan, among them being *Elsinoe veneta* on *Rubus grayanus* and *R. sieboldii*, *Macrophoma musae* [*M. musarum*] on banana [18, p. 41], and *Kmetia ampelopsidis* on *Ampelopsis heterophylla*.

Greene (H. C.). **Notes on Wisconsin parasitic fungi. XVIII.**—*Trans. Wis. Acad. Sci. Arts Lett.*, 42, pp. 69–81, 1953.

This further critically annotated report on Wisconsin parasitic fungi [cf. *R.A.M.*, 32, p. 279], most of them collected in 1952, includes additional host records and species new to the State, five of them new to science.

Dingley (Joan M.). **The Hypocreales of New Zealand. III. The genus Hypocrea. IV. The genera Calonectria, Gibberella, and Thyronectria.**—*Trans. roy. Soc. N.Z.*, 79, 3–4, pp. 323–337, 403–411, 6 pl., 1952.

In the first paper 17 species (seven new) of *Hypocrea* occurring in New Zealand are described, with brief taxonomic notes and a key. The second paper lists two species of *Calonectria* (one new), five of *Gibberella* (with one new combination), and one species of *Thyronectria*. *G.* (*Botryosphaeria*) *macrolopha* n.comb. causes cankers on living branches of *Coprosma* spp.; *G. zeae* [*R.A.M.*, 29, p. 15] is responsible for scab and ear blight of wheat and barley; *G. baccata* is a wound parasite of lemon, pear, and other hosts.

Steyaert (R. L.). **Pestalotiopsis from the Gold Coast and Togoland.**—*Trans. Brit. mycol. Soc.*, 36, 3, pp. 235–242, 3 figs., 1953.

Descriptions are given of 13 species of *Pestalotiopsis* [*R.A.M.*, 33, p. 53], including two new ones and one new variety, collected by S. J. Hughes in the Gold Coast and Togoland during 1949. The following occur on living leaves of economic hosts: *P. neglecta*, *P. theae* var. *minor*, and *P. angusta* n.sp. all on *Borassus aethiopium*, *P. guepini* on *Jatropha curcas*, *P. mangiferae* on mango, *P. palmarum* on *Diospyros* sp., and *P. maculiformans* on *Landolphia owariensis*.

Goto (K.). **Sclerotium rolfsii Sacc. in perfect stage, especially in reference to genetics, morphology in primary stage, relation of environments to sporulation and the significance of the stage for the fungus.**—*Spec. Bull. nat. agric. Exp. Sta. Tokai-Kinki* 1, 82 pp., 2 pl., 5 figs., 1 graph, 1952.

In this monograph the author brings together his studies at the Laboratory of

Plant Pathology, Tokai-Kinki National Agricultural Experiment Station, Ishinden, Japan, on the perfect state (*Corticium*) of *Sclerotium rolfsii* [*R.A.M.*, 32, p. 206]. The fungus is heterothallic and tetrapolar. It was found that optimum conditions for growth and production of the perfect state in culture were given by a solid agar medium, supplemented by plant decoctions, a pH of 5·1, darkness, adequate aeration, and a temperature between 30° and 31° C. The maturation of vegetative hyphae (as caused by sudden starvation) and humid conditions are important.

It is proposed to accept for the perfect state the name *Corticium rolfsii* in a broader sense than that originally described by Curzi [11, p. 748]. The terms primary and secondary are used instead of haploid and diploid as the hyphal cell of single basidiospore isolates is multinucleate.

Da Costa (E. W. B.), Matters (C. N.), & Tamblyn (N.). **Progress Report No. 1. Methods of describing the morphological characteristics of basidiomycete fungi in culture. Progress Report No. 2. Morphological characters of 14 cultures of basidiomycetes.**—*Progr. Rep. CSIRO For. Prod. Div. Sub.-Proj. P. 11–12* 1, 13 pp.; 2, 33 pp., 19 pl., 1 fig., 1952. [Mimeographed.]

In the first report an account is given of the methods used for culturing and describing basidiomycetes in the Division of Forest Products Laboratories, Melbourne, Australia. The fungus is described macroscopically from malt extract agar plates and from some microscopic features present in unstained mounts. The production of oxidases is detected by the discoloration of gallic and tannic acids incorporated in the medium. The characters are recorded on punched cards.

In the second report descriptions and illustrations are given of 14 cultures of 11 basidiomycete species, all described by Nobles [*R.A.M.*, 28, p. 201]. They are *Ganoderma applanatum*, *Polyporus arcularius*, *Trametes cinnabarina*, *P. dryadeus*, *P. fumosus*, *P. gilvus*, *Lentinus lepideus*, *Poria monticola*, *Lenzites trabea*, *P. vaillantii*, and *P. weirii*. Comparisons with descriptions of these species from other sources to determine whether small differences in technique might affect the cultural characteristics showed that the descriptions of most were closely comparable.

Isaac (I.). **A further comparative study of pathogenic isolates of Verticillium : V. nubilum Pethybr. and V. tricorpus sp. nov.**—*Trans. Brit. mycol. Soc.*, 36, 3, pp. 180–195, 1 pl., 3 figs., 4 graphs, 1953.

In further studies in this series, made at University College, Swansea, the morphology, physiology, and pathogenicity of two groups of *Verticillium* isolates are described and compared with *V. albo-atrum*, *V. dahliae*, and *V. nigrescens* [cf. *R.A.M.*, 29, p. 333]. Four strains forming terminal or intercalary chlamydospores are referred to *V. nubilum*, originally found by Pethybridge on the surface of potato tubers (*Trans. Brit. mycol. Soc.*, 6, pp. 104–120, 1919), while five, four of which were isolated from wilted tomato plants in different parts of England, producing microsclerotia, resting mycelium, and chlamydospores simultaneously, are assigned to *V. tricorpus* n.sp.

Isolates of *V. nubilum*, N1 (from wilted potato stalks in Kent), N2 (from soil, Kent), and N3 (from Baarn), formed round or oval chlamydospores most rapidly and abundantly on potato dextrose, prune extract, and malt extract agars, respectively. Hyaline sectors, never observed with *V. nigrescens*, frequently developed on Dox's, Czapek's, and Brown's media. The chlamydospores measured 8·5 to 15·5 μ and the lower surface of the culture was always black. After four to five days the mycelium from germinating conidia became septate, forming large, thin-walled 'cells'; during the next three days the latter enlarged rapidly and developed thick black walls to form chlamydospores. The hyphae remained fairly conspicuous and sometimes became slightly thickened and blackened. A hyaline variant of

N1 grew well on potato dextrose, Dox's, and malt agars and sporulated profusely, though no chlamydospores were formed.

V. tricorpus was characterized by a white, erect, septate mycelium, becoming bright yellow in the early prostrate stage, with hyphae about 2 to 3 μ thick, containing conspicuous oil globules. The elongated quadrate or oviform conidia measured 4 to 10 by 2·5 to 3·5 (average 6·5 by 3) μ. The hyphae of the black resting mycelium were 6 to 7 μ thick; the microsclerotia averaged 80 μ in diameter, and the black chlamydospores 7·5 by 11 μ. The best growth was obtained on potato dextrose, Dox's, and malt extract agars. A hyaline variant grew particularly well also on Czapek's agar but did not recover the ability of the parent to form black resting bodies, nor did the mycelium become swollen.

Both species grew well at 15°, 20°, and 22·5° C. and at pH 7·2 to 8·6 (*V. nubilum*) and pH 7·2 to 8 (*V. tricorpus*). Growth was poor at pH 3·6 and ceased at pH 3. Sucrose and dextrose were the best carbon sources for *V. nubilum* and these two, maltose, and glycerine for *V. tricorpus*. Wound and soil inoculation with a wide range of hosts demonstrated that the former was pathogenic to tomato and potato and the latter to tomato only, producing wilting symptoms in six to ten weeks.

Loos (C. A.). **Studies in blister blight control. XII. Dusting and spraying against blister blight on Ury Group, Passara.**—*Tea Quart.*, 24, 3, pp. 70–75, 1953.

In further studies in this series on the control of tea blister blight [*Exobasidium vexans*] in Ceylon [cf. *R.A.M.*, 32, p. 454; 33, p. 53] experiments to compare the efficiency of dusting and spraying were conducted on fields 7 (2nd year) and 8 (1st year) on the Mahapahagalla Division of Ury Estate, Passara (elevation 3,500 to 4,200 ft.), from September, 1951, to September, 1952. Each field was divided into sections: (*a*) was given 4 per cent. cuprosana dust (5 lb. per acre) applied with a hand duster or (*b*) with a Whirlwind power-duster every five days, (*c*) perenox (4 oz. to 10 gals. water) from a Vermorel knapsack sprayer at approximately 15 gals. per acre every ten days, and (*d*) was unprotected. Blight was rated on a scale from 0 (no infection) to 6 (almost total loss of plucking shoots).

On yield returns alone there was no difference between the dusted and sprayed, hardly any infection being apparent between 12th and 15th February, 1951, whereas the unprotected gave only one-fifth to one-seventh of the crop from the protected areas. Assessments in January, 1952, revealed that spraying gave the best control, the average rating being 0·5 as against 1·3 and 1·7 for the hand- and machine-dusted, respectively, and 2·8 on the unprotected. In particularly inaccessible parts of the area treated by the Whirlwind duster the bushes developed die-back from stem blisters. No die-back was observed after hand-dusting. The protection of the first year field was economic and necessary. In the post-blister period (mid-February to October) the unprotected part of field 7 had recovered sufficiently to give a yield potential as high as or higher than the protected areas, but in field 8 it was definitely lower. The average cost of protection per acre per plucking round was Rs. 2·86 for spraying as against Rs. 4·55 for Whirlwind dusting and Rs. 5·17 for hand dusting.

Bode (O.) & Koltermann (A.). **Beobachtungen und Untersuchungen über Viruskrankheiten des Tabaks im Eichsfeld.** [Observations and investigations on virus diseases of Tobacco in the Eichsfeld.]—*NachrBl. dtsch. PflSchDienst (Braunschw.), Stuttgart*, 5, 11, pp. 161–164, 10 figs., 1953.

In the summer of 1951 severe damage from viruses was observed by members of the Göttingen Plant Protection Station, Germany, in the important tobacco-growing area of the Eichsfeld, where the Virgin Gold A variety is cultivated. A survey of the affected fields was undertaken in mid-September, 1951, and in mid-

July and early September, 1952. Greenhouse inoculation experiments indicated that the viruses involved were tobacco mosaic [*R.A.M.*, 12, p. 313] alone and in combination with potato X or potato A or potato Y, potato X [cf. 13, p. 798] alone and associated with potato Y or cucumber mosaic, and potato Y alone.

Conover (R. A.) & Fulton (R. W.). **Occurrence of Potato Y virus on Tomatoes in Florida.**—*Plant Dis. Reptr*, 37, 9, pp. 460–462, 2 figs., 1953. [Multilithed.]

Infection by potato virus Y [*R.A.M.*, 28, p. 647; 33, p. 108], either alone or in combination with tobacco mosaic virus, has occurred in Florida tomato fields in most seasons since 1947. Virus Y causes leaf necrosis, downward rolling of leaflets and petioles, and moderate stunting. The combined effect of the viruses is much more severe than that produced by either alone: plants practically cease growing and fruit production is greatly reduced, the leaves show a pronounced yellow mottle and are stunted and distorted, and the fruits misshapen. The 1952 spring crop suffered severe losses, some 3,000 to 4,000 acres of tomatoes being affected. It is suggested that weeds are one of the primary sources of virus Y.

Conover (R. A.) & Walter (J. M.). **The occurrence of a virulent race of Phytophthora infestans on late blight resistant Tomato stocks.**—*Phytopathology*, 43, 6, pp. 344–345, 1953.

The susceptibility to blight (*Phytophthora infestans*) of the parental tomato stocks P–1 and P–3 at the Subtropical Experiment Station, Highlands Farm, Homestead, Florida [*R.A.M.*, 31, p. 636; 33, p. 73], during the winter of 1951–2 was tentatively attributed to the development in the locality of a virulent race of the pathogen not present in previous seasons. In order to permit a direct comparison with the 1950–1 field test, the following were grown from the same lots of seed as were used for that planting: Mo.S–34, a very susceptible commercial type; P–1, a primitive tomato that had shown uniform resistance for several seasons; 2–3 PAStW, a selection from the F_2 of P–1 × Manahill with resistance equal to P–1 in 1950–1; and 6 PAStW, the F_2 of STEP 181 (a Manahill selection) × 2–3 PAStW, which was segregating for resistance in the 1950–1 planting. Seedlings of all were inoculated with collections of *P. infestans* from naturally infected fruits in the planting of blight-resistant stocks at Highlands Farm and in commercial fields, one in Dade County, three miles from the farm, and the other at Bradenton. Seven days later they were examined and allotted to one of the disease index classes proposed by Gallegly [32, p. 403].

The results disclosed well-marked differences in virulence between the three collections of the pathogen. As in 1950–1, P–1 and 2–3 PAStW were uniformly resistant to the Bradenton and Dade County collections, 6 PAStW was segregating, and Mo.S–34 susceptible. On the other hand, all four were completely susceptible to the Highlands Farm collection. These results seem to demonstrate beyond a doubt that a virulent race of *P. infestans* was responsible for the failure of resistance in the 1951–2 planting of P–1 and P–3.

Dimond (A. E.) & Waggoner (P. E.). **Effect of lycomarasmin decomposition upon estimates of its production.**—*Phytopathology*, 43, 6, pp. 319–321, 1 graph, 1953.

The rates of decomposition of lycomarasmin [*R.A.M.*, 25, p. 84] and ferro-lycomarasmin were used in further studies at Connecticut Agricultural Experiment Station [33, p. 123] to estimate the rate of production of the toxin *in vitro* and *in vivo*, the estimation being based on the production of the non-toxic half-decomposition product I. At 28·5° C. the half-life of lycomarasmin was 5·9 days at pH 6 and 1·8 days at pH 3·6, the corresponding period for ferro-lycomarasmin being 4·2 days at pH 3·3. At higher temperatures decomposition was very much more

rapid. From these rates of decomposition and from a statement [25, p. 84] that the yield of lycomarasmin *in vitro* is 0·06 mg. per ml. in 60 days the authors find the evidence insufficient to claim that the toxin is produced in adequate amounts *in vivo* to cause the wilting of tomato plants associated with *Fusarium oxysporum* f. [*bulbigenum* var.] *lycopersici* [cf. 32, p. 122].

The decomposition of lycomarasmin is accompanied by loss of the iron-chelating property also, suggesting that its activity on plant cells is a function of the iron-lycomarasmin chelate complex [cf. loc. cit.].

Singh (B.) & Srivastava (H. C.). **Damping-off of Tomato seedlings.**—*J. Indian bot. Soc.*, 32, 1–2, pp. 1–16, 1 pl., 1 fig., 1953.

Damped-off tomato seedlings, a serious nursery problem in the Uttar Pradesh, yielded pathogenic isolates at the Agricultural College, Kanpur, of *Pythium indicum* [*R.A.M.*, 31, p. 609], *P. aphanidermatum* [32, p. 221], *Phytophthora parasitica*, *Rhizoctonia* [*Corticium*] *solani*, *Sclerotium rolfsii*, *Phoma betae*, and *Fusarium* sp. *Pythium indicum* and *Phytophthora parasitica* could be separated by inoculating mixed cultures into *Hibiscus esculentus* and *Ricinus communis*. All the pathogens infected tomato seedlings up to the age of five weeks. Varietal tests demonstrated that Marglobe was the most susceptible and Oxheart the least.

Of several seed treatment fungicides tested, ceresan controlled pre-emergence damping-off best, giving 8·3 per cent. infection, compared with 36·6 in the untreated. Pre-sowing soil treatment with formaldehyde dust adsorbed on charcoal ash (15 : 85), applied at 24 to 40 gm. per sq. ft. to the top 3 in. of soil, checked the disease and, combined with ceresan seed treatment, gave excellent control. Spraying the seed-beds every three days after sowing with Cheshunt compound or 2·5 per cent. formalin controlled damping-off.

Minev (K.). Пепелница на Дабот (**Microsphaera alphitoides Griff. et Maubl.**) во Кичевскиот реон. [Oak mildew (*Microsphaera alphitoides* Griff. & Maubl.) in the Kičevo region.]—*Annu.* (*Fac. Agron. Silvic.*) *Silvic. Skoplje*, 3, (*1949–50*), pp. 195–204, 2 figs., 1951. [German summary. Received 1953.]

Oak mildew (*Microsphaera alphitoides*) [*R.A.M.*, 9, p. 278] causes serious damage and losses in the oak forests of the Kičevo region of Macedonia, Yugoslavia. Of the oak trees growing in this region, *Quercus conferta* was most susceptible, also *Q. sessilis* and *Q. cerris* at 600 to 900 m. *Q. lanuginosa* and *Q. cerris* were more resistant over 900 m. Mildew was not observed on *Q. macedonica*. Control with chemicals is recommended but development of resistant varieties is essential. The mildew parasite *Cicinnobolus cesatii* appears in a considerable measure in July.

Griswold (C. L.) & Neiswander (R. B.). **Insect vectors of Oak wilt fungus.**—*J. econ. Ent.*, 46, 4, p. 708, 1953.

At the Ohio Agricultural Experiment Station endospores of *Chalara quercina*, the agent of oak wilt [see following abstracts] were detected on the legs and in the intestinal tract of several adults of *Drosophila melanogaster* that had fed upon and deposited eggs on sporulating mycelial mats. There is also reason to believe that *Pseudopityophthorus minutissimus* and *P. pruinosus* are concerned in the transmission of the disease [cf. *R.A.M.*, 33, p. 125].

Craighead (F. C.), Morris (C. L.), & Nelson (J. C.). **A preliminary note on the susceptibility of wounded Oaks to natural infection by the Oak wilt fungus.**—*Plant Dis. Reptr*, 37, 9, pp. 483–484, 1953. [Multilithed.]

During investigations carried out by the Division of Forest Research, Harrisburg, Pennsylvania, to determine the importance of wounds in the spread of oak

wilt (*Endoconidiophora fagacearum*) [*Chalara quercina*: see preceding and next abstracts], 194 trees in three widely separated areas were wounded (bark bruises, drill holes, or axe cuts) periodically from 23rd March to 31st July, 1953, the wounds being covered nine or 13 days after they were made. In two of the areas some wounded trees became infected, all near diseased trees with mycelial mats and fertile perithecia. Insect larvae collected from these wounds represented several species of Nitidulidae and Diptera. No trees wilted in the third area, where the only sources of inoculum observed were mats bearing conidia.

Barnett (H. L.) & Staley (J. M.). **Isolation of compatibility types of Endoconidiophora fagacearum from Oak wilt trees naturally and artificially inoculated.**—*Phytopathology*, 43, 6, pp. 341–343, 1 diag., 1953.

The results of further studies on oak wilt (*Endoconidiophora fagacearum*) [*Chalara quercina*: see preceding abstracts] at the Department of Plant Pathology, West Virginia University [*R.A.M.*, 33, p. 125], corroborated the scanty available evidence that few naturally infected trees yield isolates of both A and B compatibility types, which were, in fact, recovered from only two out of 43 trees sampled during 1952. The recovery of only one compatibility type (with one exception) from each of six trees artificially inoculated with A and B spore mixtures indicates a selection and survival of a single type in each tree, the factors involved in which appear to become operative soon after infection.

The frequency of oaks bearing perithecial mats [32, p. 701] seems considerably to exceed that of trees containing both compatibility types. The evidence appears to confirm the view that the natural production of perithecia normally follows the transfer of conidia between mycelial mats of opposite compatibility types rather than the intermingling of mycelia in the same tree.

Příhoda (A.). **Lesnický význam choroše Phaeolus rutilans (Pers.) Pat.** [The importance in forestry of the fungus *Phaeolus rutilans* (Pers.) Pat.]—*Preslia* (formerly *Studia bot. čechosl.*), 24, 1, pp. 41–44, 2 figs., 1952. [Russian and English summaries.]

Phaeolus [*Polyporus*] *rutilans* [cf. *R.A.M.*, 11, p. 680], most commonly found on oak and beech in Czechoslovakia, is regarded in forestry as more useful than harmful because it destroys the dry branches of these trees and accelerates their fall. The fungus is more harmful on birches, causing decomposition of the wood of dead or dying tree trunks, and mountain ash (*Sorbus aucuparia*), attacking living trees, particularly in the mountains, where it causes premature death.

Pejoski (B.). Придонес кон познавањето на Буковината во Н. Р. Македонија. [Contribution to the knowledge of Beech red rot in P.R. of Macedonia.]—*Annu. (Fac. Agron. Silvic.) Silvic. Skoplje*, 3 (*1949–50*), pp. 83–105, 4 figs., 6 graphs, 1951. [German and French summaries. Received 1953.]

A recent survey of beech (*Fagus moesiaca*) forests in Macedonia, Yugoslavia, for the presence of red heart disease [*R.A.M.*, 28, p. 551] indicates that it is found in all of them with only rare, isolated trees free from the disease. Typical concomitants of the disease are *Stereum purpureum* [30, p. 549], *Hypoxylon coccineum*, *Tremella faginea*, *Bispora monilioides*, and *Schizophyllum commune* [16, p. 354]. Infection usually begins at the age of 60 years. At first saprophytic fungi grow in the heart wood and cause the red colour; only later do the pathogenic species start a destructive rot.

Vergnano (Ornella). **Caratteristici effetti del boro su piante di Olmo e Pioppo nella zona dei soffioni boriferi di Travale (catena metallifera toscana).** [Characteristic effects of boron on Elm and Poplar plants in the zone of the boriferous

steam vents of Travale (Tuscan metalliferous range.)]—*Nuovo G. bot. ital.*, N.S., 60, 1–2, pp. 225–229, 3 figs., 1953.

A description is given of the symptoms of boron injury on the leaves of elms (*Ulmus montana*) and poplars (*Populus nigra*) growing by a brook in the centre of the area of the boriferous steam vents of Travale, in the upper basin of the river Merse, province of Grosseto, Italy. The symptoms agreed with those described by Eaton on various hosts in California [*R.A.M.*, 21, p. 26; 24, p. 117]. In the elm leaves the boron content was 1,000 p.p.m. of dry matter, as compared with 300 p.p.m. for leaves of elms growing in the Botanical Gardens, Florence, and other non-boriferous areas.

Oaks (*Quercus cerris*, *Q. sessiliflora*, and *Q. pubescens*) in the area appeared quite normal.

RENNERFELT (E.). **Om angrepp av rotröta på Tall.** [On the infection of Scots Pine by root rot.]—*Medd. SkogsforsknInst., Stockh.*, 41 (*1952*), 9, pp. 1–39, 11 figs., 4 diags., 1 map, 1953. [English summary.]

Some of the information in this important study of the root rot (*Fomes annosus*) of Scots pine (*Pinus sylvestris*) in Sweden has already been noticed from other sources [*R.A.M.*, 26, p. 367; 29, p. 595; 30, p. 65]. Spruce is the preferred host of the fungus, but on poor, sandy soils in the south of the country Scots pine, usually free from attack, is highly susceptible. As postulated by Rishbeth in England [31, p. 640], the development of root rot is generally, but not invariably, incited by felling. Spread from tree to tree in a diseased stand is largely effected by root contact, as was demonstrated by the examination and mapping of infected root systems of pines in a 20-year-old stand. There are many healthy, mostly long-established pine stands on the poor sandy soil usually considered to favour the occurrence of root rot, while conversely, several cases of infection have been observed in first-generation trees on formerly arable land, possibly because the mycelium of *F. annosus* meets with no resistance from the microflora in soils of the latter type.

It is difficult to account for the regeneration of badly diseased stands, since the infected roots remaining in the soil provide a ready means for the attack of new trees, and young, self-sown pines have, in fact, been destroyed in this way in several instances. Experiments are in progress on the replacement of pines by more resistant species, such as beech and oak. Deciduous trees are normally resistant to *F. annosus*, but birches are subject to infection on sandy soils and the same applies to larches (*Larix europaea* and *L. leptolepis*), which otherwise withstand the disease reasonably well.

In tests with extracts from soils sampled at different levels the mycelium of *F. annosus* made no appreciable growth except in those from the humus layer (0 to 3 cm.). It is thought unlikely that the fungus survives in humus in nature, at any rate in the sandy soils under observation.

DAY (W. R.). **The growth of Sitka Spruce on shallow soils in relation to root-disease and wind-throw.**—*Forestry*, 26, 2, pp. 81–95, 1 diag., 5 graphs, 1953.

Examination of 30- to 35-year-old Sitka spruce plantings growing on shallow soils in northern Britain [*R.A.M.*, 30, p. 6] to ascertain what factors other than parasitic infection were acting to cause thinning of crowns, death of the trees, and susceptibility to wind-throwing showed that the main factor was restricted rooting space with consequent deficiencies in air or water supply, leading to the death of the roots. Low nutrient status of soil per unit volume and defoliation caused by parasitic attack are, apparently, only secondary factors. If parasitic infection were an important factor, decline and death would be present on the more favourable sites, where, however, the unhealthy condition does not occur.

Rudd Jones (D.). **Studies on a canker disease of Cypresses in East Africa, caused by Monochaetia unicornis (Cooke & Ellis) Sacc. I. Observations on the pathology, spread and possible origins of the disease.**—*Ann. appl. Biol.*, 40, 2, pp. 323–343, 1 pl., 9 graphs, 2 maps, 1953.

This is a full account of studies on cypress (*Cupressus* spp.) canker (*Monochaetia unicornis*) in Kenya [*R.A.M.*, 24, p. 39; 33, p. 16, *et passim*], much of which has already been noticed from other sources. The disease appears to have spread from south-east to north-west with the south-east monsoon, and occurs in almost all the cypress-growing parts of Kenya, Tanganyika [28, p. 246], and Uganda, and single records have been reported from Southern Rhodesia and South Africa. The oldest known infections in Kenya occurred in 1937. The three strains of the fungus found in nature [31, p. 8; 32, p. 65] differ in size of acervuli and conidia. Acervuli ripen and conidia are released three to eight weeks after the rains start. Conidial viability may persist for 28 months.

The records of the disease suggest that it started from one focus, probably Shume Magamba in Tanganyika. The fungus may be a mutation from a strain which has been detected parasitizing the indigenous *Juniperus procera*. On this host there are two 'strains', one pathogenic and the other non-pathogenic to cypresses, though there is also the possibility that it may have been introduced from abroad.

Fischer (G.). **Untersuchungen über den biologischen Abbau des Lignins durch Mikroorganismen.** [Studies on the biological decomposition of lignin by micro-organisms.]—*Arch. Mikrobiol.*, 18, 4, pp. 397–424, 3 figs., 2 graphs, 1953.

In laboratory experiments at the Technical Institute, Stuttgart, Germany, lignin was decomposed by 'lignin bacteria' and a number of fungi [cf. *R.A.M.*, 33, p. 63] isolated from forest soil or rotting wood, among the most active being *Fusarium lactis* and *F. nivale* [*Calonectria nivalis*], while *Trichoderma viride*, *Alternaria tenuis*, and *Stemphylium botryosum* var. *botrytis* were somewhat less efficient. *Merulius domesticus* [*M. lacrymans*], primarily a cellulose-destroyer [28, p. 477], was shown to be capable of utilizing lignin in a soluble form.

Purushotham (A.), Sudan (S. K.), & Sagar (V.). **Preservative treatment of green bamboos under low pneumatic pressures.**—*Indian For.*, 79, 12, pp. 652–672, 8 pl., 1953.

This paper on the economic importance, distribution, and preservative treatment of bamboos [*R.A.M.*, 32, p. 461] includes brief descriptions of the various methods of treating living trees and green timber. During experiments carried out from 1925 to 1942 at the Forest Research Institute, Dehra Dun, India, dried bamboos were treated with water soluble preservatives of the fixed type and with creosote-fuel-oil mixtures (50:50 by weight). Unsatisfactory results with poor preservative penetration were obtained even when pressure processes were used or with an absorption of 4 to 5 lb. per cu. ft. of creosote mixture, most of the specimens treated succumbing to attacks by fungi and termites within the next eight years. Dried bamboos split before pressure impregnation with ascu remained undecayed, however, even after 14 years. Five or six days' treatment of green bamboos by the Boucherie process gave good protection against termites, fungi, and borers. In recent experiments with this method, natural absorption being supplemented by pneumatic pressure (10 to 15 lb.), passage of zinc chloride into green *Bambusa polymorpha* and *B. nutans* was satisfactory, 0·5 lb. of the compound per cu. ft. of bamboo being considered sufficient to protect against decay in the open, or 0·3 lb. for use indoors. The minimum treatment period required in the latter case is two hours, but 0·25 to 0·5 hours is sufficient for prophylactic purposes. Treatment

of *B. mutans* and *Dendrocalamus strictus* with Boliden salts, ascu, copper-chrome-boric composition, chromated zinc chloride, and fire-proof plus antiseptic composition was in some cases very poor because of resistance to the flow of the preservative, and this matter is now being investigated.

A table showing the recommended preservatives, concentration, absorption in bamboos, duration of treatment, and expected service life for green bamboos for various purposes is provided.

NARAYANAMURTI (D.) & VERMA (G. M.). **Studien zur Biochemie holzzerstörender Pilze.—Vierte Mitteilung. Zersetzung von Holz und anderen Stoffen.** [Studies on the biochemistry of wood-destroying fungi.—Fourth note. Disorganization of wood and other substances.]—*Holz a. Roh- u. Werkst.*, 11, 6, pp. 226–227, 1 graph, 1953.

In pure culture studies at the Forest Research Institute, Dehra Dun, India, *Polystictus sanguineus* [*R.A.M.*, 33, p. 127] on peptone or on the sapwood of *Dalbergia sissoo* in the form of sawdust, shavings, and sticks, consumed more glucose than peptone. Pure cellulose was not disorganized. The growth of the fungus ceased after four to 4½ months. The status of *P. sanguineus* as a white rot fungus was demonstrated by its preference for lignin as compared with cellulose, the ratio of cellulose to lignin increasing with the progress of decay, and reaching about 50 per cent. more than the initial ratio after four months on sawdust and shavings and 13 per cent. on sticks.

HAMLYN (BRENDA M. G.). **Quantitative studies on the transmission of Cabbage black ring spot virus by Myzus persicae (Sulz.).**—*Ann. appl. Biol.*, 40, 2, pp. 393–402, 1953.

In a study at Rothamsted Experimental Station of factors affecting the transmission by *Myzus persicae* of cabbage black ring spot virus (which closely resembles turnip mosaic virus) [cf. *R.A.M.*, 32, p. 294; 33, p. 4] isolated from swede, aphids prevented from feeding for 15 minutes or more before feeding for a few minutes on an infected Early Snowball turnip plant gave more local lesions on White Burley tobacco than unfasted aphids. Fasted aphids acquired virus from infected plants in ten seconds, and transferred it to healthy plants in five. Increasing the test-feeding periods to 30 minutes increased the numbers of infections, but lengthening infection-feeding periods to five minutes had little effect; longer than five minutes greatly reduced the number of transmissions. This reduction was offset to some extent if the aphids were prevented from feeding continuously while on the infected plants. With undisturbed infection-feeding periods of 15 minutes or longer, previously fasted aphids caused no more infections than unfasted ones. Infective aphids lost their ability to produce lesions more rapidly when feeding than when fasting. Winged and wingless aphids were equally effective vectors.

COLHOUN (J.). **A study of the epidemiology of club-root disease of Brassicae.**—*Ann. appl. Biol.*, 40, 2, pp. 262–283, 3 graphs, 1953.

This is an amplified account of studies at Queen's University, Belfast, on club root of cabbages (*Plasmodiophora brassicae*) [*R.A.M.*, 31, p. 216]. The level of spore load (within the limits of 10^3 to $2{\cdot}5 \times 10^7$ spores per gm. of soil) does not affect the number of diseased plants in acid soils when conditions favour infection and host growth. In less favourable conditions spore load does have an effect.

No disease developed in alkaline soils when the soil moisture fluctuated or remained constant at low levels. In general, conditions most favourable to the incidence of the disease were also most favourable to its intensity. There were no marked differences in incidence between different soils [cf. 33, p. 5], but more plants became affected in the lighter soils when conditions were less favourable to infection.

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ERRATA

Vol. XXXII, page 667, line 16, *for* 'mistletoe' *read* 'scion of the variety Mistletoe'
Vol. XXXIII, page 60, line 33, *for* '1953' *read* '1952'
line 40, *for* 'more' *read* 'less'